

THE
Psychological Review

EDITED BY
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JOHNS HOPKINS UNIVERSITY AND PRINCETON UNIVERSITY
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THE PSYCHOLOGICAL REVIEW.

STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF THE UNIVERSITY OF CHICAGO.

COMMUNICATED BY PROFESSOR JAMES ROWLAND ANGELL.

THE RÔLE OF THE TYMPANIC MECHANISM IN AUDITION.¹

BY W. V. D. BINGHAM.

This paper reports a case of a person who enjoys good hearing in spite of the destruction of the 'sound-conducting' mechanism of both ears. When she first came under our observation, in the summer of 1906, her auditory acuity was such that a group of acquaintances who had been her constant associates for several weeks had not suspected any auditory impairment; and at the present time, although the condition of her hearing is not as good as it was then, it is still acute enough to enable her to carry efficiently forward her work as a teacher.

The statement that efficient hearing is still possible after both drum membranes have been destroyed and the larger ossicles removed comes as a surprise to those whose attention has not been previously directed to the pathology of the ear. It means that the account which Helmholtz gave of the mechanism of sound-conduction is untenable, at least as regards his theory of the sound-intensifying function of the tympanic membrane. Dissatisfaction with this theory has been rife in otological circles for some years, owing to its inadequacy when confronted by the facts of aural pathology. Beckmann² in

¹ The MS. of this article was received April 8, 1907.

² 'Zur Theorie des Hörens,' *Verhandl. der deutsche otol. Ges.*, 1898. See Treitel, 'Recent Theories of Sound-conduction,' *Archives of Otolaryngology*, 1903, p. 385. Treitel gives an admirable summary of the literature up to 1902, and concludes that the problem of the middle ear has not yet been solved.

1898 went the length of maintaining that the tympanic apparatus is not a sound-conducting device, but is merely a damping mechanism. Zimmermann¹ also substitutes a damping for a transmitting function, but holds, contrary to Beckmann, that the damping operates only with sounds of unusual intensity. He assumes that the sound waves are transmitted by air conduction across the tympanic cavity to the promontory wall, and thence through bone to the basilar membrane fibers. It is the function of the round window to make possible the most subtle reaction of these fibers. The ossicles and the stapedius muscle serve to regulate the intra-labyrinthine pressure. Secchi² finds in the round window the sole pathway for sound through the tympanum to the labyrinth. The tympanic membrane and ossicles together with the intrinsic muscles protect the inner organs against detonations and also serve to regulate the intra-tympanic pressure during attentive hearing. Of the defenders of modified forms of the Helmholtz theory, Bezold and Lucae are the most able and active. They are agreed that for high tones conduction through the larger ossicles is of little importance. Lucae³ insists that the round window as well as the plate of the stapes is capable of receiving sound-waves. Both movements could exist together, a compensatory opening for minimal pressures produced by the inward movement of the stapes being found in the aquæductus vestibulæ, and for the fenestral membrane in the aquæductus cochleæ. Bezold⁴ does not hold to the Helmholtz account of the sound-intensifying action of the drum membrane, but he contends vigorously for the theory of conduction through the ossicular chain. When the skull is set in vibration by direct contact with a sounding fork, the labyrinth as well as the chain is actuated, yet only those waves are effective which, on their way to the labyrinth have actuated the chain to transverse vibration. The function

¹ In addition to the articles summarized by Treitel, cf. 'Der physiologische Werth der Labyrinthfenster,' 1904, *Arch. f. Physiol.*, Suppl. Bd., S. 193. Also S. 409 and S. 488.

² *Arch. f. Ohrenheilk.*, LV., Heft. 3-4. Cf. Treitel, *l. c.*

³ *Arch. f. Physiol.*, 1904, Suppl. Bd., S. 490.

⁴ "Weitere Untersuchungen über 'Knochenleitung' und Schallleitungsapparat im Ohr," *Zeits. f. Ohrenheilk.*, XLVIII., 107.

of the tympanic mechanism is the conversion of longitudinal sound-waves into transverse vibrations, which alone are capable of setting into sympathetic vibration the receiving apparatus of the cochlea. Bezold is reported as saying "that there is no hearing for the lower half of the tone scale without a tympanic membrane and an ossicular chain, and that in the case of the upper part of the scale the sound-waves are transmitted to the labyrinth by vibrations of the stapedial foot-plate."² The earlier part of this conclusion is controverted by the existence of such cases of audition as the one here described.

Thirty-six years ago, when Miss Evans, as she may be named, was five years of age, a siege of scarlet fever left her with a middle-ear discharge (suppurative otitis media) which ruptured both ear drums. In the right ear this chronic discharge has never healed: and in the left, except for two brief periods of temporary cessation, it continued until the fall of 1906. During girlhood the only method of treatment which was tried, that of syringing, proved very painful and was little used. The earliest aurist's record available was furnished by Dr. Clarence J. Blake, otologist of the Harvard Medical School, who treated the case in 1888-90. His records show partial destruction of both drum membranes at that time. "Hearing was effected by direct transmission of the sound waves to the base plate of the stapes. There was no evidence of cochlear involvement." An accumulation of cicatricial adhesion hindered the free vibration of the stapes, so that hearing was considerably below normal. (Note that the decreased acuity is not explained by reference to the condition of the tympanic membrane or the 'sound-conducting' mechanism. Dr. Blake says: "In the great majority of suppurative cases the decreased mobility of the stapes either from altered position of the ossicular chain or from tissue changes within the fenestral niche is the essential thing.")

In 1898, Dr. M. D. Jones, of St. Louis, operated upon the right ear, removing the remnant of the tympanic membrane, the accumulations of cicatricial adhesions and the two larger ossicles which had become much necrosed. No operation has been performed upon the left ear, but the incus has been lost

² Hartmann, in report of German otological society in Wiesbaden, May 29 and 30, 1903. *Archives of Otolaryngology*, XXXII., 286.

and the drum membrane is almost totally destroyed. In each ear the stapes is imbedded in an accumulation of scar tissue, and in the right, poorer, ear is completely hidden from view. The Eustachian tubes are completely closed at times, preventing the draining of the mucous of the middle ear into the throat, and causing an accumulation which interferes with hearing. Miss Evans states that her hearing varies with her general nervous condition.

In August, 1906, at the time of making the first of the auditory tests here reported, the ears were discharging very slightly and were therefore probably at their best as to function. Dr. J. B. Shapleigh, of St. Louis, who has had the case under observation for the past two years, informs me that usually "improvement in the local inflammatory conditions in these cases brings better hearing, but it is not uncommon to find that when all secretion ceases and the ear becomes dry, the hearing becomes less. This is undoubtedly due to the dry tissues being more rigid and stiff than when moist since with a recurrence of slight discharge an increase in hearing is noticed." These variations in hearing doubtless have their cause in "the varying mobility of the stapes and the membrane of the round window, but especially of the former. In many cases of exhausted middle ear suppuration with large loss of the drum membrane and with absence of the incus — the conducting chain being thus broken — very fair hearing may exist, provided the stapes is freely movable and not hampered by adhesions or thickened tissue in the niche of the oval window." A considerable diminution in Miss Evans' hearing ability has taken place since she was tested in the summer of 1906. This is due, however, to a recurrence of the old inflammation of the membranes brought on by a severe cold, and is not traceable to a complete cessation of the discharge with consequent lack of the moisture which seems to be essential for maximum flexibility of the annular ring of the stapes and the membrane of the round window. No use is made of 'artificial drums' or other mechanical aids to hearing.¹

¹The best 'artificial drums' so called are mere pledgets of cotton, deftly adjusted to increase the pressure upon the stapes to precisely the right amount. Sometimes, when the drum membrane is lacking, a bit of vaseline placed upon the head of the stapes serves to weight it properly and considerably augment hearing.

In the laboratory Miss Evans was first tested in auditory acuity, tonal limits, pitch discrimination, localization of sound and analysis of clangs. It is regretted that, owing to the brief period which elapsed between the discovery of the case and the necessary departure of Miss Evans from the city, some of the tests had to be rather fragmentary. Six months later it was possible to make a few supplementary tests which were directed in part to determining whether the subject's general sensitivity is supernormal. Some additional data were also gathered on the hearing of difference-tones.

In this connection it ought to be remarked that cases of audition somewhat resembling this one are not of extremely rare occurrence in the records of otological clinics. The additional features which give to this case an especial value for purposes of experimental observation are to be found in the high intelligence, the more than ordinary powers of concentration, and the facility in introspection which the observer brought to her tasks.

The Rinné test was negative: that is, a sounding fork which had become so faint as to be no longer audible by air conduction could be heard again if placed against the mastoid process of the temporal bone. The Weber phenomenon was prominent; when a vibrating fork was pressed against the top of the head, the sound was localized in the right, poorer, ear, even when the fork was placed much nearer to the better ear. Such results indicate that the hearing defect is due to trouble in the mechanism of the middle ear and not in the sound-receiving apparatus of the cochlea.

In testing auditory acuity, the Seashore audiometer was used, and also the whispered-word test. The audiometer gives a simple noise of fairly constant quality and of an intensity varying from 0 to 40 units of an arbitrary scale. The normal threshold lies somewhat below the middle of this scale. Eight students with apparently normal hearing were tested at the same time with Miss Evans, and their thresholds of acuity were found to range between 15 and 25.¹ At the first day's trial Miss Evans'

¹ On the standard instrument of the C. H. Stoelting Co., an acute ear can hear intensity 13. A comparison of our instrument with this standard, after the tests

threshold was determined as 26 for the left ear and 28 for the right. Later this was reduced to 25 and 27.

Since it sometimes occurs that good hearing for conversational speech is accompanied by poor hearing for certain simple noises, and *vice versa*, the audiometer test was supplemented by the whispered-word test. For determining comparative auditory efficiency in this way, Andrews¹ has prepared ten lists of ten numerals each, which contain the different varieties of consonant and vowel speech elements in much the same proportion in which they are found in spoken language. The use of numerals presents the advantage of uniform apperceptive value for all observers and for all the words. This is so well recognized among aurists that whispered or spoken numerals are almost universally employed in diagnosis. The traditional method of using this test is to determine the maximum distance at which the observer can hear the numerals. Auditory acuity is expressed by a fraction of which this distance is the numerator and the normal distance is the denominator. For purposes of accurate determination, Andrews criticises this method on the ground that its validity rests on two assumptions which his experiments have led him to question; first, that intensity of the sounds of speech decreases with approximate regularity as the distance from the speaker increases; second, that the sounds used as test words undergo with change of distance merely a quantitative and not a qualitative alteration. As an improvement upon this 'method of extreme ranges,' Andrews recommends the 'method of degree of accuracy,' in which auditory acuity is determined by comparing an observer's percentage of accuracy at a given distance with the normal percentage at the same distance under identical acoustical conditions.

Andrews' lists of numerals were pronounced to Miss Evans and six control observers at the same time. They were seated with the left ear toward the speaker, Miss Evans being given

had been made, showed that the magnet of the telephone receiver had lost some of its strength, and that in consequence the click was not quite as loud as it should be. This point should be borne in mind if comparisons are made between the figures given above and readings taken with other audiometers.

¹ *Am. Jour. Psy.*, 1904, XV., 36.

the central position. Each was provided with paper on which the numbers were recorded as heard. If the observers had been tested separately it would have been possible to have them hear the words from identically the same place in the room; but that plan would have sacrificed something of uniformity in enunciation. Even when the usual precautions, of using the residual breath after exhalation, etc., are taken, some differences in intensity must still remain. In the method here used, these inequalities were minimized. Accidental distractions, such as outside noises, were also the same for all the observers.

At a distance of three feet Miss Evans' degree of accuracy was 97.5 per cent. That of the others varied from 98.5 per cent. to 100 per cent., only one observer hearing every syllable correctly. At fifteen feet Miss Evans heard 70 per cent. correctly, while the record of the others varied from 88 per cent. to 99.5 per cent., the average being slightly less than 95 per cent. These figures show clearly by how much Miss Evans' hearing is less than normal. It would be entirely incorrect to characterize her as 'hard-of-hearing.'

The question may arise whether in Miss Evans' case the auditory nerve may not be more sensitive than that of the average person. Tests made in several different sense realms failed to disclose any general hypersensitivity. Both eyes are very slightly astigmatic and far sighted. Bright illumination is often painful. Tests with an oculist's chart showed that the visual acuity of the left eye was normal and that of the right eye a very little less than normal. Sensitivity to differences of brightness was tested by means of a Masson disc rotated in an illumination of diffused daylight. Miss Evans pointed out a gray ring which differed from the background in brightness by $1/150$ and was uncertain as to the next ring which differed from the background by $1/214$. The four other observers tested at the same time pointed out both of these rings correctly, and one saw a ring which was even fainter. Miss Evans' sensitivity to differences of brightness is then certainly not supernormal. Tests in matching Holmgren worsteds disclosed an unusually well cultivated color discrimination. Æsthesiometer tests on the forearms revealed nothing unusual in her tactile discrimina-

tion of two points; and tests with small lifted weights indicated no peculiar muscular sensitivity. The only tests which point to a sensitivity above the average were with the Cattell algometer. The transition from the sensation of 'pressure' to that of 'pressure-plus-pain' was unambiguous. The threshold on the nail of each index finger was 1 kg. (average of six tests at different times; average deviation .1 kg.). On the right thumb nail the threshold was 1.5 kg.; on the left, 1.2 kg.; on the right and left temples, each 1 kg. While these results do not fall within the range of hyperæsthesia, they are below the average for women.

Although Miss Evans manifests no general hypersensitivity, it is natural to suppose that her auditory sensitivity has been developed to a high degree during the many years of middle-ear difficulty when it was necessary to exercise more than ordinary efforts of auditory attention.

In testing for the upper tonal limit, an Edelmänn-Galton whistle was used. If Edelmann's calibrations on this particular pipe hold good for the light bulb-pressure used, and for the prevailing barometric pressures and temperatures of Chicago, a majority of observers can hear tones of from 44,000 to 49,000 vibrations per second (the pipe-length being from 0.32 mm. to 0.16 mm. and the width of lip 0.62 mm.). These are, roughly, the pitches f^8 and g^8 . Miss Evans heard on the first day tested 22,000 vibrations (2.17 mm. with same width of lip) with the right ear, and 24,000 vibrations (1.87 mm.) with the left. These tones are not far from f^7 and g^7 . A few days later Miss Evans could hear 32,000 vibrations (1.01 mm.) with the left ear. While this is half an octave below normal, it is well within the range where perfectly healthy ears of middle-aged persons often reach their higher limit.

The lower limit for the left ear was below 32 vibrations or within an octave of normal. With the right ear no tone could be heard from any of the Appunn forks, the smallest of which gives 64 vibrations. At the organ, it was possible to hear a pipe of 64 vibrations with this ear, if the swell box was open but not otherwise. When three pipes were sounding pedal *C* of the contra-octave, 32 vibrations, the observer could detect a sound

with the better ear closed, but it is probable that what she heard was a clang of upper partials. One of these same low pipes sounding singly could barely be heard with the better ear at a distance of 25 feet, while two other observers could hear it at 70 feet. In these tests it required an appreciable length of time for Miss Evans to decide whether a pipe were sounding or not. With pitches and intensities near her lower limit of hearing, her discrimination time was often as long as a second and a half.

A test for the integrity of the scale between 32 and 32,000 vibrations revealed no discontinuities or tonal islands. A series of tests to discover the fundamental tones of the tympanic cavities which the absence of an accommodatory apparatus would make prominent was not completed.

Miss Evans has not a 'musical ear,' and had had no practice in pitch discrimination. When first tested she made errors in gross musical intervals; but with a little practice she developed considerable accuracy in telling which of two tones was the higher. On the third day she was able to discriminate correctly differences of one vibration per second ($1/32$ tone) from c^1 of 256 vibrations. In these tests heavy Koenig forks mounted on resonators were used. It is much easier to approximate uniformity of intensity with these than with the unmounted forks sometimes employed.¹

In the tests on clang analysis, the chief interest centered about the hearing of difference-tones. It will be recalled that a tone arising from the simultaneous sounding of two tones from independent sources does not actuate a resonator tuned to its vibration rate; consequently it must have its origin within the ear. To account for these so-called subjective difference-tones, Helmholtz advanced the theory that the asymmetrical form of the tympanic membrane necessitates that when it is set in vibration by two different sounds it must vibrate also at a rate equal to the difference between the rates of the two primaries, and

¹ Such instances as this one, where excellent discrimination of small pitch differences accompanies a total lack of natural musical ability and interest, call attention to a fallacy involved in Seashore's suggestion of using rough tests of pitch discrimination in determining whether a public-school pupil has a sufficiently 'musical ear' to make it worth while for him to be given any musical education. (*Univ. of Iowa Studies*, II., 55, and *Educ. Rev.*, XXII., 75.)

thus generate the difference-tone. A secondary hypothesis based upon the looseness of articulation between malleus and incus was held to be applicable when the primaries are very loud. Later workers in this field, notably Stumpf, Ebbinghaus, ter Kuile, Max Meyer, Hurst and Ewald, have developed theories of audition which seek to explain the facts of difference-tones by a mode of functioning of the structures within the inner ear, but no one of these theories has succeeded up to the present time in commanding general assent by meeting all of the facts.

Recently K. S. Schaefer¹ has shown that a telephone diaphragm will generate difference-tones which set in vibration properly attuned resonators; and the suggestion has been made that Schaefer's experiments point toward a rehabilitation of the Helmholtz theory that subjective difference-tones take their origin in the tympanic membrane.

An instance of good audition in which the tympanic membranes and larger ossicles are lacking presented the opportunity for a crucial experiment. The results were unequivocal: Miss Evans hears the so-called subjective difference-tones.²

For preliminary practice use was made of small Quincke tubes and high-pitched organ pipes. The observer was soon able to distinguish the first and second difference-tones. Then she was set the task of tuning a Stern tone-variator to unison with the lower difference-tone arising from two organ pipes actuated from independent sources of wind supply. On the first trial she succeeded. The second trial was a failure, the variator being tuned not to the pitch of the difference-tone, but to a pitch closely consonant with it. The observer was much fatigued by the taxing strain of these experiments, and her error is not surprising, especially when one considers the dissimilarity

¹Ueber die Erzeugung physikalischer Kombinationstöne mittelst des Stentortelephons,' *Annalen der Physik*, 1905, XVII., 572.

²Dennert, in reporting his experiments with interruption-tones ('Akustisch-physiologische Untersuchungen,' *Arch. f. Ohrenheilk.*, 1887, XXIV., 173), says: "Ich habe nun Patienten ohne Trommelfell, auch solche ohne Trommelfell, Hammer und Amboss, mit nur erhaltenem Steigsbägel, auf dieses Verhalten hin geprüft und gefunden, dass sie ebenfalls Combinationstöne hören." Unfortunately he gives no further information regarding the hearing of his patients or the manner in which the tests were made.

of timbre between the difference-tone and the objective tone of the variator.

On the following day the procedure was varied in two particulars. Heavy Koenig forks mounted on resonance-boxes were used to produce the primary tones, and the observer, who never sings, was asked to choose on a harmonium the tones corresponding to the first and second difference-tones. She would begin with the lowest note on the harmonium and try each one in turn until she found the desired pitch. While the observer was searching for the correct pitch the experimenter was careful to stand out of her field of view, to exclude the possibility of an unconscious choice on the basis of some involuntary movement on his part. At another time the observer was told that among the thirty odd forks before her were two which had the same pitch as the difference-tones, and she was asked to find them. In all of these tests she was uniformly successful.

The pitch-numbers of most of the forks used were in simple ratios, so that the difference-tones were in close harmonic relation to the primaries. Lest it should be objected that the observer, knowing in a vague way what was expected, had sought among the available tones until she found the ones that *fused* most perfectly with the primaries, two forks were selected whose vibration rates were as 5 to 7. The lower difference-tone would then be 2, and the higher 3. If the observer were selecting her tones on the basis of fusion she would have chosen the lower octaves of the primaries: but as a matter of fact she tried these when she came to them and rejected them as promptly as any of the others.

The successful issue of these experiments shows that subjective difference-tones may be generated without the aid of the tympanic membrane or any mechanism of the middle ear. This in no way reflects upon Helmholtz's mathematical proof that asymmetrical membranes must vibrate under the influence of two sound-waves of sufficient amplitude in such a manner that one, two or more additional pendular vibrations are generated. But it does prove that such an explanation is not an adequate account of the phenomenon of subjective difference-tones.

The question at once arises whether the tympanic mechanism, while not essential to the hearing of difference-tones, may not augment them. It is conceivable that combination-tones may have a physical origin within the labyrinth, as Schaefer urges,¹ and also in the tympanic mechanism, as Helmholtz held. It is possible that wherever two sonorous vibrations of sufficient amplitude simultaneously actuate the same body, they may generate a pendular vibration of a rate equal to the difference between their rates. Lord Rayleigh is authority for the statement that practically all bodies manifest the required asymmetry even in the case of aerial vibrations. He says, "Whether we are considering progressive waves advancing from a source, or the stationary vibrations of a resonator, there is an essential want of symmetry between the condensation and rarefaction, and the formation in some degree of octaves and combination-tones is a mathematical necessity."²

It was thus desirable to establish whether, in comparison with observers who possess tympanic membranes, Miss Evans is able to hear difference-tones relatively as well as she hears the primaries.

An attempt to determine this point was made when, in February 1907, an opportunity occurred to perform some additional tests. As has been already indicated, Miss Evans' hearing had considerably diminished since the first experiments were made. The audiometer showed an acuity of 31 and 40(?) instead of 25 and 27. Whispered words were heard with difficulty at three feet which had been heard at fifteen feet. The upper tonal limit was reduced to 3.45 mm. and 4.46 mm. (17,000 and 14,000 vibrations). The lower limit for the better ear had risen to 48 vibrations. Bone conduction for tones of 64 and 128 vibrations was as good as before, if not better; but the negative Rinné was greater in each case.

The procedure adopted was as follows: two mounted forks were selected whose vibration numbers were 768 and 896, a ratio of 6 to 7. Miss Evans correctly located the pitch of the

¹ 'Eine neue Erklärung der subjectiven Combinationstöne,' *Arch. f. d. ges. Physiol.*, LXXVIII., 505.

² *The Theory of Sound*, second edition, 1896, Vol. II., 459.

lower, louder difference-tone. By means of two auscultation tubes leading from a common stem, Miss Evans and a control observer well trained in auditory discrimination listened to the sound of the same fork. The experimenter, by moving the mouthpiece of the tube to and from the resonating box of the fork could make the sound appear and disappear irregularly. The observers, who were seated back to back, indicated by a movement of the finger when they heard the sound and when they did not. This made it possible for the experimenter to determine, with the aid of a stop-watch, the difference in the ringing-off time for the two observers. Lest there might be an inequality in the carrying-power of the two auscultation tubes, their use was alternated between the observers.

In eight trials with the lower fork, the control observer could hear it for an average of 13.5 seconds longer than Miss Evans; average deviation 1 second. The higher fork died away more rapidly, and here the difference in ringing-off times for the two observers averaged 7 seconds, average deviation less than 1 second. Lastly the two forks were sounded together, and the length of time that the difference-tone could be distinguished was recorded, together with the time between the disappearance of the difference-tone and the disappearance of the primaries for each observer. The experimenter had no check on the introspections of the observer as to the length of time the difference-tone was audible, as it was impossible for him to vary its intensity without modifying the primaries. Under such circumstances the imagination is certain to be a dangerous factor, and the difference-tone will sometimes continue to be reported as heard after it has passed below the limit of audibility. The higher of the two forks always died away before the lower, and if it were actuated lightly again, immediately after the difference-tone was reported as lost, the difference-tone did not always reappear, although if this primary were made as loud as the other, the difference-tone was once more reported as audible. Now for Miss Evans, the difference between the ringing-off times of the separate forks, 6.5 seconds, was only one second shorter than the average time between the disappearance of the difference-tone and the vanishing of the louder, lower primary. Appar-

ently the difference-tone could be heard nearly as long as both primaries continued to be audible. This was not the case with the control observer, who lost the difference-tone six seconds before he ceased to hear the weaker primary. One is forced to suspect that Miss Evans continued to hear the difference-tone in imagination after it had passed below her limit of audibility. She herself remarked upon her uncertainty in distinguishing between vanishing sensation and vivid image. How difficult this discrimination is, those who have practiced clang analysis well know. Because this undetermined factor was present, the quantitative results are unreliable, and one cannot assert with confidence the conclusion which the experiments strongly suggested, that Miss Evans' hearing for difference-tones is relatively better than that of a normal observer with intact tympanic membranes.¹

A few tests in auditory localization in the horizontal plane were made in August, 1906. Use was made of the relatively pure tone of a tuning fork, the clangs of a stopped pipe and a reed pipe and the noise of a metallic click. The ease and accuracy of localization was in proportion to the complexity of the sound rather than to its intensity. Of the errors made with sounds not in the median plane, somewhat more than half were on the right side. At the present time, Bard² is championing the theory that the middle ear contains a mechanism which accommodates to distance and direction. The nature of the rhythmic movements of the chain of ossicles is in part determined by the angle of incidence of the sound-wave upon the membrane, and the perpendicular and tangential components of this motion supply elements to the inner ear which are significant for orientation of the origin of the sound. The tensor tympani adapts the tension of the drum-membrane to weak or loud sounds.

¹ Since the above was placed in type the writer has learned that K. S. Schaefer has found in Berlin several cases of patients who hear without drum membranes, and some who lack the larger ossicles; and all are able to hear difference-tones. A full description of these interesting cases with a discussion of their bearing upon theories of difference-tones may be expected soon from Dr. Schaefer's pen.

² 'Des diverses modalités des mouvements de la chaîne des osselets,' *Jour. Physiol. Pathol.*, 1905, VII., 665.

The stapedius however, according to Bard, is autonomous and not antagonistic. It draws backward the head of the stapes, and with it the whole chain and the handle of the malleus, making tense the anterior portion of the drum-membrane, relaxing the posterior portion, and adapting for the *distance* of the sound. The significance for such a theory of data obtained from an observer who lacks this accommodatory mechanism is obvious, and it is regretted that it was not possible to carry through an extended series of localization tests.

Summary.—A person who through disease and operation lost the tympanic membrane and most of the ossicular chain of both ears is not 'hard-of-hearing' but possesses very efficient auditory acuity. The foot-plate of the stapes in each ear is covered by scar tissue, and it is possible that if the vibrations of the stapes were not thus hindered, auditory acuity would be fully normal. Sensitivity in other sense realms is not supernormal. Absence of the tympanic membranes does not prevent generation of 'subjective' difference-tones.

As to the significance of the tympanic mechanism in audition, such a case as this one suggests that the physical sound-conducting functions have been quite generally over-emphasized; while the physiological, protective functions have been treated with neglect. What the eye-lid does for the eye, the drum membrane does for the ear. It protects delicate structures against irritation and injury, and permits the inner membranes to be kept moist and in a condition of maximum efficiency.¹

¹The writer desires to express his gratitude to Professor B. B. Breese for his kindness in granting, for the second set of tests, the privileges of the psychological laboratory of the University of Cincinnati.

ON THE METHOD OF JUST PERCEPTIBLE DIFFERENCES.¹

BY F. M. URBAN.

If a subject is required to compare two stimuli S_1 and S_2 many times the judgments vary without any apparent order, so that one is unable to tell what the judgment will be in a given experiment, but in a great number of experiments each judgment tends to occur in a certain percentage of all the cases. This is the formal character of random events and we introduce the notion of a probability of a judgment of a certain type, assuming that there exists a definite probability in every experiment that the experiment will result in a judgment of a certain type. Let us denote by the letter p the probability that S_2 will be judged greater than S_1 , and by q the probability that a judgment will be given which is not a 'greater' judgment. The latter group contains all those cases in which S_2 is judged smaller than S_1 and those cases in which the stimuli seem to be equal.

In applying the method of just perceptible differences one starts from two stimuli which seem to be equal, increasing one stimulus until a difference is perceived; this difference is recorded as a determination of the just perceptible positive difference. Then starting from inequality of the stimuli one diminishes the stimulus of greater intensity until the two stimuli seem to be equal; this difference is put down as a determination of the just imperceptible positive difference. Both these results are combined into a mean, which is called the limen or threshold of difference in the direction of increase. By a similar series of experiments one determines the just perceptible negative difference and the just imperceptible negative differ-

¹ Delivered at the meeting of experimental psychologists at Philadelphia, April 17 and 18, 1907. This paper is an abstract of a chapter of a monograph on psychophysical methods, which is to appear in the monograph series of the Psychological Laboratory of the University of Pennsylvania.

ence, the average of which is the threshold in the direction of decrease. A considerable number of such determinations for each standard stimulus is required, because a single determination is not very reliable. The discrepancies between the results are eliminated by means of an algorithm which is nothing else but an application of the method of least squares.

The method of just perceptible differences requires that the subject compares pairs of stimuli which have one stimulus, the standard stimulus, in common and that these pairs are ordered according to the magnitude of the comparison stimuli so that

$$r_1 < r_2 < \dots < r_n.$$

There exists for every pair a certain probability that the judgment 'greater' will be given and we call these probabilities

$$p_1, p_2, \dots, p_n$$

where p_k is the probability that in the comparison of the stimulus r_k with the standard the judgment 'greater' will be given. The probabilities that a judgment will be given which is not a 'greater' judgment are correspondingly

$$\begin{aligned} 1 - p_1 &= q_1 \\ 1 - p_2 &= q_2 \\ &\dots \\ 1 - p_n &= q_n. \end{aligned}$$

Presenting this series of stimuli to the subject the first pair on which the judgment 'greater' is given, all the previous pairs being judged 'smaller' or 'equal,' is a result for the method of just perceptible differences. The probability that a stimulus will be noted as a result of the method of just perceptible differences is, therefore, identical with the compound probability that this stimulus is judged greater, and that on all the smaller stimuli judgments are given which are not 'greater' judgments. Denoting these probabilities by P_1, P_2, \dots, P_n we find

$$\begin{aligned} P_1 &= p_1 \\ P_2 &= q_1 p_2 \\ P_3 &= q_1 q_2 p_3 \\ &\dots \\ P_n &= q_1 q_2 \dots q_{n-1} p_n. \end{aligned}$$

In a considerable number of determinations each pair will be obtained as an observation of the just perceptible difference in a number of times which is proportional to this probability, and the results of N series of experiments, after being brought in proper order, will have the following form:

The stimulus r_1 occurred NP_1 times, which gives for the final determination r_1P_1N .

The stimulus r_2 occurred NP_2 times, which gives for the final determination r_2P_2N .

.

The stimulus r_n occurred NP_n times, which gives for the final determination r_nP_nN .

The method of just perceptible differences requires that the average of all the values r_kP_kN be taken as a final determination of the threshold, which is

$$M = \frac{1}{N}(r_1P_1N + r_2P_2N + \dots + r_nP_nN) = r_1P_1 + r_2P_2 + \dots + r_nP_n.$$

The technical name of this expression is the mathematical expectation for the result of this series.

A number of interesting conclusions may be drawn from this analysis of the method of just perceptible differences, but its immediate psychological importance becomes clearer by the following considerations. Taking the average of a series of observations has the signification of determining the most probable value of the quantity observed. This interpretation, however, can be given to the arithmetical mean only if the distribution is symmetrical. It is obvious that such a supposition is not justifiable for any particular series of comparison stimuli. The distribution of the P 's depends entirely on the values of the p 's, which in turn depend on our choice of the comparison stimuli. It may be that the distribution is symmetrical in a particular case, but generally it will not be. The average of our observations, therefore, will not have the character of the most probable value, if we use only one series of pairs of comparison stimuli. For the further interpretation of the method one circumstance which is of the greatest importance, has been observed in almost all serious investigations without its importance being recog-

nized. As a rule one does not work with one series only, but different comparison stimuli are used and the results of all these determinations are combined. For such a combination of independent distributions the theorem holds which Bruns calls the conservation of the $\Phi(r)$ -type, and which may be formulated in this way: The mixture of independent distributions tends towards the $\Phi(r)$ -type. If we are careful to use several different series of comparison stimuli the average of all the results will have the signification of the most probable value. The most probable value is the one for which P_k is a maximum. One can show without difficulty that P_k is a maximum independent of our choice of the following stimuli if $p = \frac{1}{2}$. We come to the conclusion that the average of all the observations is that amount of difference for which there exists the probability one half that the judgment 'greater' will be given. By a series of similar considerations one finds that the quantity which we determine by the algorithm of the method of just perceptible differences as the just imperceptible positive difference is that amount of difference for which there exists the probability one half that the judgment 'greater' will not be given. The combination of the just perceptible and the just imperceptible difference, *i. e.*, the arithmetical mean, gives a more refined determination of the same quantity.

These considerations have some bearing on the practical application of the method of just perceptible differences. The first is that one must record all the judgments given in order to get the most out of one's results. In this way one obtains a set of results in the working out of which one may step over from the method of just perceptible differences to the method of right and wrong cases at any moment. If one records only the first pair of the series on which the judgment greater was given, one will obtain good results, but the little saving of clerical work is more than compensated by the loss in the lucidity of the results. The second important point is to vary the steps 'by which one approaches the threshold,' because otherwise one can not make the supposition of a symmetrical distribution. The third point is that the value of the P 's is not changed by the order in which the pairs are presented. It is, therefore, not essential to let the

pairs follow in the order of the magnitude of the comparison stimuli. One may give the stimuli r_1, r_2, \dots, r_n in any order whatsoever. All the judgments are recorded and from the records one finds the smallest stimulus on which the judgment 'greater' was given, and combining the results of several such experiments one obtains a result which is identical with that of the method of just perceptible differences. The method of giving the pairs in irregular order has the advantage of eliminating the influence of expectation on the part of the observer and there is no difficulty in working out the results since our discussion has shown that the order in which the stimuli are presented is not essential for the method of just perceptible differences.

This method was frequently the object of severe criticism and it is perhaps not void of interest to make some remarks on how its accuracy compares with that of the method of right and wrong cases. The empirical data of both methods are the same, namely empirical determinations of probabilities. The accuracy of such determinations depends on the so-called coefficient of precision in Bernoulli's theorem. This quantity depends on the probability which is to be determined in this sense, that it is smallest for the value one half and it increases when the probability which is to be determined approaches zero or the unit. In the formulæ given above the P 's are products of the p 's, and P_k is always smaller than p_k except for $k = 1$ where $P_1 = p_1$. The precision in the determination of the P 's is, therefore, greater than in that of the p 's. The method of just perceptible differences makes use of the P 's and, with the same number of experiments, its accuracy will be greater than that of the method of right and wrong cases which starts from the p 's.

We will illustrate these theoretical considerations by some results of a series of experiments on lifted weights. The standard stimulus of 100 gr. was compared with weights of 84, 88, 92, 96, 100, 104, and 108 gr. The standard was always the first to be lifted and the judgments were given on the second stimulus. In the experiments a terminology was used similar to that suggested by Martin and Müller, but for the present purpose the results are classed as 'heavier' judgments and judgments which were not 'heavier' judgments. Table I.

TABLE I.
PROBABILITIES OF A 'HEAVIER' JUDGMENT.

r_h	h	$not-h$	r_h	h	$not-h$
84	0.0222	0.9778	100	0.5289	0.4711
88	0.0244	0.9756	104	0.8156	0.1844
92	0.1111	0.8889	108	0.9044	0.0956
96	0.2933	0.7067			

TABLE II.
VALUES OF P_h FOR THE DETERMINATION OF THE JUST PERCEPTIBLE
POSITIVE DIFFERENCE.

84	0.0222
88	0.0238
92	0.1060
96	0.2487
100	0.3169
104	0.2302
108	0.0471
Σ	0.9949
R_1	0.0050

shows the observed relative frequencies of 'heavier' judgments in the column marked ' h ' and in the column ' $not-h$ ' the differences of these numbers from the unit for one of seven subjects. These numbers of relative frequency are empirical determinations of the underlying probabilities of a 'heavier' judgment and one may compute on this basis the value of P for every comparison weight. The results of this computation are given in Table II. This table shows that the P 's increase at first and then approach zero very rapidly after having attained a certain maximum. Multiplying these numbers with the intensity of the corresponding comparison stimuli and adding these products gives what we have to call the just perceptible difference, if the distribution is symmetrical. This result is given in Table III. We must get the same result within the limits of accuracy of an empirical determination, if we count how many times it occurred that each weight was the lightest weight of the entire series to be judged 'heavier.' This means that the judgment 'smaller' or 'equal' is given on all the preceding weights and that this

$$^1R = q_1, q_2, \dots, q_7.$$

TABLE III.

VALUES OF $r_k P_k$ FOR THE DETERMINATION OF THE JUST PERCEPTIBLE POSITIVE DIFFERENCE.

84	1.8648
88	2.0944
92	9.7520
96	23.8752
100	31.6910
104	23.9408
108	5.0868
Σ	98.3050

weight is judged 'heavier.' The results of this observation are given in Table IV., where under the heading r_k the intensities of the comparison stimuli are given and under the heading N_k the number of times each stimulus was the smallest on which the judgment 'heavier' was given. These results are given for four different series each one comprising 100 experiments with each pair of comparison stimuli. It will be noticed that in some of the columns the sum of all these numbers is somewhat smaller than 100. This is due to the fact that those series in which no 'heavier' judgment is given do not yield a result by the method of just perceptible differences, which is also expressed by the fact that the P_k do not add up exactly to one as shown in Table II. The combined result of all the four series together is given in Table V. The difference between the computed value and the observed values is very small.

TABLE IV.

RESULTS OF OBSERVATIONS ON THE JUST PERCEPTIBLE POSITIVE DIFFERENCE IN FOUR SERIES (IVA., I., III. AND IV.) OF 100 EXPERIMENTS EACH.

r_k	IVA.		I.		III.		IV.	
	N_k	$r_k N_k$	N_k	$r_k N_k$	N_k	$r_k N_k$	N_k	$r_k N_k$
84	4	336	2	168	1	84	1	84
88	—	—	3	264	4	352	3	264
92	8	736	18	1,656	7	644	12	1,104
96	25	2,400	26	2,496	27	2,592	23	2,208
100	30	3,000	23	2,300	28	2,800	37	3,700
104	24	2,496	19	1,976	31	3,224	21	2,184
108	8	864	6	648	2	216	2	216
Σ	99	9,832	97	9,508	100	9,912	99	9,760
Average		99.47		98.02		99.12		98.59

TABLE V.
RESULT OF THE COMBINED SERIES.

r_k	N_k	$r_k N_k$
84	8	672
88	10	880
92	45	4,140
96	101	9,696
100	118	11,800
104	95	9,880
108	18	1,944
Σ	395	39,012
Observed result		98,714
Computed result		98,305
Difference		0.409

In a similar way one may find the just perceptible negative difference from the same series of experiments. For this purpose one first has to find the numbers of relative frequency for the 'lighter' judgments and the relative frequencies of judgments which are not 'lighter' judgments. From these numbers which are given in Table VI. one may find the probabilities P that a

TABLE VI.
PROBABILITIES OF 'LIGHTER' JUDGMENTS.

r	l	$not-l$	r_k	l	$not-l$
84	0.9333	0.0667	100	0.2311	0.7689
88	0.8622	0.1378	104	0.0956	0.9044
92	0.7000	0.3000	108	0.0156	0.9844
96	0.4489	0.5511			

certain comparison weight will be obtained as a determination of the just perceptible negative difference (see Table VII.). By

TABLE VII.
VALUES OF P_k FOR THE DETERMINATION OF THE JUST PERCEPTIBLE
NEGATIVE DIFFERENCE.

108	0.0156
104	0.0941
100	0.2058
96	0.3073
92	0.2641
88	0.0976
84	0.0145
Σ	0.9990
R	0.0010

multiplying these probabilities with the intensity of the corresponding comparison stimuli one finds the number with which each stimulus is most likely to come down for the determination of the just perceptible negative difference, and by adding these numbers one finds this difference itself. Table VIII. gives the course of this computation and Table IX. shows how the

TABLE VIII.
VALUES OF $r_k P_k$ FOR THE DETERMINATION OF THE JUST PERCEPTIBLE
NEGATIVE DIFFERENCE.

84	1.3104
88	8.5888
92	24.2972
96	29.5008
100	20.5764
104	9.7864
108	1.2180
Σ	95.2780

computed result agrees with the observations on the same subjects. This table shows how many times it happened that each stimulus was the greatest to be judged 'lighter,' *i. e.*, how many times this stimulus was judged 'lighter' when all the stimuli of greater intensity were judged 'heavier' or 'equal.' The coincidence of the observed results with the computed results is very close as it is seen especially in Table X. The same experiments were made on six other subjects and the general outcome was invariably the same: the coincidence of the observed results

TABLE IX.
RESULTS OF OBSERVATIONS ON THE JUST PERCEPTIBLE NEGATIVE DIFFERENCE IN FOUR SERIES (IVA., I., III. AND IV.) OF 100 EXPERIMENTS EACH.

r_k	IVA.		I.		III.		IV.	
	N_k	$r_k N_k$	N_k	$r_k N_k$	N_k	$r_k N_k$	N_k	$r_k N_k$
84	2	168	1	84	2	168	4	336
88	6	528	12	1,056	13	1,144	17	1,496
92	30	2,760	23	2,116	28	2,576	33	3,036
96	29	2,784	29	2,784	24	2,304	30	2,880
100	21	2,100	19	1,900	28	2,800	14	1,400
104	10	1,040	13	1,352	1	104	2	208
108	2	216	3	324	4	432		
Σ	100	9,596	100	9,616	100	9,528	100	9,356
Average		95.96		96.16		95.28		93.56

with the theoretical results is very close in all the cases; in some cases it is less, but in other cases it is considerably greater than in our example.

TABLE X.

RESULT OF THE COMBINED SERIES.

r_k	N_k	$r_k N_k$
84	9	756
88	48	4,224
92	114	10,488
96	112	10,752
100	82	8,200
104	26	2,704
108	9	972
	400	38,096
Observed result		95.240
Computed result		95.278
Difference		0.038

We come to the conclusion that the experimental procedure which was described by Fechner and Wundt as the method of just perceptible differences, by Müller and Titchener as the method of limits, is peculiarly well adapted for its purpose. It may be handled in such a way as to yield experimental data which can be worked out as well by the algorithm of the method of right and wrong cases as by that of the method of just perceptible difference despite the fact that the pairs of comparison stimuli are not presented in the order of their intensity which seemed to be an indispensable feature of this method. The theoretical basis of the method of just perceptible differences is the same as that of the error method, namely empirical determinations of the probabilities of judgments of different types on given differences of intensity. The result of the so-called method of just perceptible differences is that amount of difference for which there exists the probability one half that it will be recognized.¹

¹ The MS. of this article was received May 27, 1907. — Ed.

THE ULTIMATE VALUE OF EXPERIENCE.¹

BY PROFESSOR STEPHEN S. COLVIN,

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In a brief article appearing in this REVIEW last November, I pointed out what seemed to me to be certain essential characteristics of experience, emphasizing particularly the thought that experience is the ultimate essence of the universe, and as such is subject, and never object. Hence it follows that this most fundamental of all activities cannot be known, since we can know only objects. The experience of the moment is pure being, immediate and underived, while objects experienced are always conditioned being, mediate and derived; yet only through these, can experience as such be described or comprehended.

This experience, however, as subject, while thus distinguishable from the objects of experience is not something separable from them. Without them it could not exist as experience. It is not something left over and above them, but becomes an actuality only through its objects. Just as light is invisible where there are no objects for it to illuminate, so experience vanishes when the objects of experience are no more. Yet, although experience becomes actual only in its objects, it is not merely a logical shadow of these objects themselves. It actually *is*, although itself it is incapable of being experienced. To give it a mere formal existence to satisfy the demands of thought would be absurd. It is more actual than any or all of its objects. It belongs to another order of being, unknowable because unmediated, final, undefined.

Nothing, then, can be said of this experience except to deny to it certain qualities which its objects possess. Its objects flow and develop; they are limited by temporal and causal categories. With them nothing is final; all is relative and incomplete.

¹This paper was read before the Western Philosophical Association, Chicago, March 30, 1907.

They have no values in themselves, but possess worth only in terms of their origin and goal. Their significance is acquired in the process of their development into and integration with other objects of experience. Experience as ultimate being, however, cannot be limited, or dependent on anything else for its value. If it possesses worth and significance, this cannot be because it leads anywhere, nor because it serves any ulterior purpose. If it has value that value must be ultimate and complete.

Little satisfaction, however, can come from such negative determinations as these, and we might well let the whole matter drop here, were it not for the fact that among the objects of experience there exists a group which, although clearly derived and secondary in their nature, still in a way function for this unknowable, absolute experience, and come to take its place. This group of experienced objects which I refer to, forms the core of our objective existence. They reside largely in those sensations that are at the basis of instinctive expressions, that lend color and warmth to more external objects — they combine into emotions, and give the notion of the self as a feeling and active being; they are subconscious; they suggest a beyond; they point, as they vanish from a world of conscious objectivity to a realm of completed being which contains all and conditions reality.

These subconscious experiences, then, functioning for an absolute into which they seem to recede and from which they appear to be derived, may be studied by the psychologist, analyzed and defined, and this analysis may be taken in a certain way as representing the pure, subjective experience of which they are symbols. These concrete experiences, however, should never be identified with the subject of experience, as is often the case. They are subjective only in a relative sense. Even the self-experience itself is an object among other objects and cannot be considered as anything more than a phase or aspect of experience, certainly not the experience as such.

This relatively immediate aspect of this group of objects of experience is, I take it, the psychological entity to which Professor James has given the name of 'pure experience'; it is the

part which may be called simple sensation, mere feeling, undefined longing, objectless impulse. It is as such an abstraction, because it never exists in its purity, or if it does so exist it is essentially unknowable. This pure experience is that part of the total experience which is least objectified, that tends the least to develop; that, however, as far as it does develop, gives up its original character, and passes into something quite different. In so far as it remains undeveloped, however, it resists analysis and hence comes to be regarded as quite apart from the clear-cut objects of experience in the center of consciousness. Thus, vaguely defined and relatively unknowable, it has been the fruitful source of mysticism and absolutism in philosophy. Here is found, for example, Fichte's Absolute Ego, which refuses to reveal itself completely in the personal me, and of which no assertion can be made.

Such, then, is this phase of objective experience which may be studied by the philosopher and psychologist as representative and symbolic of the unconditioned subject of experience, or experience as such. One of its most striking and interesting characteristics is that it in a certain sense possesses an ultimate value. This core of our objective world does not readily pass over into the more fleeting objects to which it gives value and degrees of worth; it tends to remain in itself and to be satisfied with itself. Its worth, like that of the absolute experience, is in the moment, non-temporal and in a sense eternal. *Its value is simply because it is*, not because it grows into something else. It is not good or bad because it is pleasurable or painful. As experience, it is good; it can be bad only in the sense that it is not as rich an experience as might be possible. The good of the universe from this standpoint is not summed up in the thought more pleasurable experience, but rather more experience. Common sense recognizes this fact in often cherishing those experiences that have been full of pain and trouble because they have given glimpses of realities unknown to more mild and pleasurable states of mind. "To have loved and lost is better than never to have loved at all," for the experience itself with all its bitterness has an ultimate value because it is an experience.

In these days, however, we seem to be in danger of losing sight of this fact, not in our practice probably, but very possibly in our theorizing. We see this tendency to forget that immediate experience has a value in and for itself exemplified in the modern theory of utilitarian and prudential ethics, and in its companion theory, in intellectual philosophy, twentieth century pragmatism.

This is perhaps somewhat striking when we remember that utilitarianism is the legitimate offspring of hedonism, which in making pleasure the norm of action, affirmed the ultimate value of experience. For pleasure is pleasure of the moment. It is the eat-drink-and-be-merry-for-tomorrow-we-die variety. Only when it began to rationalize pleasures, put some above others as more worthy or satisfying, did hedonism and modern utilitarianism depart from its original position and seek values not given in the experience as such.

The same seems to be true of pragmatism to an extent. It also starts with immediate reality in the pure experience of James, and seems clearly to reaffirm this principle of immanence in the doctrine that truth is satisfaction. My purpose here is not, however, to dwell on this phase of the inconsistency, but rather to point out that in the rational development of these two philosophies they seem at times to have very thoroughly forgotten the immanent basis from which they alike originated. To emphasize this latter point we may consider more definitely modern utilitarianism in some of its teachings.

The essence of this doctrine may be summed up, I believe, in the statement of 'voluntary general altruism' (so called), that the end of virtuous striving is to secure the greatest good for the greatest possible number on the whole and in the long run. This demands that any act, if it be truly ethical, shall consider all the consequences that may flow from it, and thus justify or condemn itself. On the surface there seems to be no possible objection to such an ethical philosophy, except perhaps the difficulty of securing any satisfactory criterion on which to base an evaluation of conduct. This, however, is no real objection to the theoretical bearings of the system. If we look more closely, however, I believe we can detect an inherent weakness

in the doctrine, which relates itself to the general topic under discussion in this paper, and which shows this school of ethical theorists to have been better logicians than they were psychologists. I can perhaps make my point clearer by a concrete example.

Let us suppose that a person has fallen into the water and is in danger of drowning. Someone standing on the bank may have an impulse to jump in and attempt at the risk of his own life to rescue the other. Now if the man on the bank chances to be an utilitarian philosopher he must consider the consequences of his deed in terms of the general good. Perhaps the man that is drowning is of little value to the world, while the person who feels moved to risk his own life in order to save the unfortunate in the water may occupy an important place in the affairs of men. Then he should refrain from the attempt, since the greatest good demands his own safety be considered as of primary importance. This seems a simple case of logic, but I am persuaded that it is too simple. In the analysis something has escaped that is more valuable than that which has remained, an act of heroism and a heroic impulse have perished. Clearly this has worth — a worth arising not merely from the consequences that flow from heroic deeds, but a worth in itself. It is good to be heroic. As an ultimate experience heroism has value; considered in a mere timeless relationship it is good.

So the utilitarian philosopher must revise his reasoning in this particular emergency. He must include in his calculations of ultimate benefits this impulse of heroism and find its place in his scale of values. He must see to it that it finds its due place. Now this readjustment may seem to satisfy the demands of the situation. Logically the system may be thus justified; but psychologically such an attempt would prove an absurdity.

For let us assume that the utilitarian philosopher attempts in the evaluation of his act to consider the worth of the impulse that prompts it; let us suppose that he brings into his focal consciousness his instinctive heroism. In that moment the impulse vanishes, the instinct dies. No one can be heroic if he analyzes his heroism. As has already been pointed out it is impossible to bring these subconscious tendencies and feelings into attention and have them remain in their true value.

Thus it happens that utilitarianism can never evaluate this element. It falls into an obvious dilemma. If the impulse is to exist, it cannot form a part of the ethical scheme, which thus becomes inadequate; if rational analysis attempts to place it in the scale of values it disappears from experience. Its value as an ultimate reality precludes the possibility of its entering into the mediate world of rationalized and clearly objectified experience.

Of course it would be quite possible in retrospect to evaluate this impulse. This, however, would not give it a place in the realm of ethical values in the moment of their existence, and would not help, therefore, in the actual situations of life. Further this evaluation, in retrospect or in prospect, of impulses tends to destroy these impulses as such. If we lay bare our affective life it becomes deadened and mechanical. The real enthusiasm, the spontaneity of expression, fail us; sympathy becomes mere prudence; courage, rational foresight; just indignation, calculating expediency, and so on. This is one of the greatest faults of the practical ethics of our present age; over-analysis has often eliminated the 'Schöne Seele' and even the 'Categorical Imperative.'

If we turn from a consideration of utilitarian ethics to utilitarian epistemology we find a parallel difficulty. It is here in the noetic realm exactly on a level with hedonism in the conative realm; for hedonism says pleasure is the norm of goodness, pragmatism says that satisfaction is the measure of truth. So any pleasure that is genuine is good; any satisfaction that is real is truth. Here is pure immanence, a genuine absolute, self-contained and unconditioned. Yet soon we find these two philosophies seeking to go outside this immanence to distinguish between pleasures and satisfaction in order to rationalize their view-points and organize their thinking. Naturally such a procedure is necessary if a system is to be built up. My sole criticism here would be that their immanent starting point would never in itself have developed into such a system without the injection of something quite foreign to it in its original form. Hedonism and pragmatism can be attitudes of feeling and action, but never in their original forms ethics or epistemology.

Although in the discussions on pragmatism which have appeared during the last few years truth has been often spoken of as a feeling of satisfaction, the pragmatist has not actually held to this description of the experience without soon going beyond it. Ethical utilitarianism was long ago forced to depart from its immanent starting point to evaluate goodness; so, too, pragmatism has continually sought justification by measuring satisfaction in something outside of the immediate satisfaction. It has recognized that it could not consider satisfaction as such the badge of truth, but only that satisfaction which is based on wide experience and clear intelligence. Otherwise the satisfaction of the unthinking dogmatist would stand for a greater truth, generally speaking, than the more mild and less permanent contentment of the critical seeker after reality. Clearly this further evaluation is quite desirable and necessary. It is not, however, in accord with that aspect of pragmatic philosophy that has its basis in pure experience.

In its growth pragmatism like utilitarianism has gone very far from a subjective basis; it has become indeed the complete opposite of absolutism, whether subjective or objective. It is a philosophy of development, it has no finality, no abiding, no permanence. Its only universal truth is that there is no universality to truth. What is good in the scheme of utilitarian ethics to-day may be bad tomorrow; what is true in the fabric of utilitarian epistemology to-day may be false tomorrow.

The parallelism between the two doctrines may be carried still farther. It has already been pointed out how the ethical utilitarian in attempting to evaluate conduct and to arrive at the greatest good, leaves out of necessity the very impulses from which good actions spring, which impulses are of themselves of final worth, not because they lead anywhere but because as immanent experience they have an ultimate value. So, too, intellectual utilitarianism in carrying out its principle that truth depends on relationships is compelled to ignore that factor which gives truth its final value, namely that sense of conviction that comes with every conclusion. This impulse to assert that the truth we arrive at is not a merely relative affair, and to believe that in some way it has a transcendent value is charac-

teristic of all thinking that ends in a proposition. There is a feeling that in some way an abiding fact has been reached.

Of course in the next moment, the thinker may find his assertions unsatisfactory and incomplete, and thought may develop toward a new resting place. However, in the moment that we have an experience of truth, we possess a feeling of conviction. This conviction is quite at variance with the attitude that holds to relativity and incompleteness. This intellectual emotion does not thrive well under pragmatic logic. Enthusiasm for truth does not tend to abound and spread over the earth, when it is made known that truth as such is not to be gained. The utilitarian who confidently asserts that a situation is true because it works (or because you can work it), is not apt to realize that the very reason why the situation works is because there goes with it a feeling of conviction. Action does not develop in uncertainty. To hesitate is here as elsewhere to be lost. The feeling of certainty is necessary but is not easily included in the pragmatic scheme; here it tends to lose its instructive force and immanent value; for like the tendency toward right action, this impulse toward true action vanishes as soon as it is forced into the world of partial and conditioned values. The instinct of certainty will not work if it is valued only as a thing to be worked; but, since it is at the basis of all workable propositions, nothing will work without it being present; yet no pragmatist may say, — "Go to, I need this certainty, in order to have my situation work out truly, therefore I will possess myself of this feeling in order that I may work it to my practical advantage." And even if the pragmatist could accomplish this impossibility; even if by such a means he could make his situations work as best satisfy his demands, he would have failed to have gained that ultimate experience of truth, which knows no relativity in the moment of the experience and which in the scale of human values has a final and abiding worth.

Such a humanizing experience can never come to the philosopher nor scientist who believes that the truth he now possesses, at this moment, is merely a relative affair, and true only in the sense that it fits temporarily into a scheme of workable relations. As in ethics speculation on a moral impulse helps to

destroy it, so in logic reflection on the instinct of certainty tends to remove all certainty, and thus to hinder intellectual progress. The result is the same in either case, a moral or an intellectual sophistry.

To sum up the foregoing:

Ultimate experience as such cannot be known, since only objects can be known; yet such ultimate experience is an actuality. Of it as such nothing can be said, except to deny to it the characteristics of the objects of experience. There is, however, in every experience a group of objects that function in a sense for the ultimate experience (the subject of the objects experienced), and which may be taken as symbolic of the pure experience that does not reveal itself. One of the most important characteristics of this relatively subjective and immediate aspect of experience is that it seems to have an ultimate value and finality in itself. In modern times two philosophic creeds have arisen out of this immanent experience, the one utilitarianism and the other pragmatism. Both have in a sense assumed the validity of this immanent experience, the one in the doctrine of pleasure as the ultimate end of striving, the other in the assertion that satisfaction is the badge of truth; yet in the development of their philosophic beliefs both have departed at once from the immanent point of view, thus ignoring their origin. Further, these two systems in their evaluation of goodness and truth have not taken account of the goodness that is good in and for itself, and the truth that is self-contained and unconditioned. They have in other words, disregarded the ultimate worth of that part of our experience that is relatively subjective and which ordinarily does not enter into the flux of a constantly changing world.

The true point of view seems to be that there are elements in our experience that have what may be termed a final value in the moment of that experience, that point back to no conditioning reality, nor forward to a growing system of facts. Here are found impulses and feelings that lie at the basis of our moral and intellectual judgments and give all experience its significance, not only because of that which is to follow, but also because of that which actually is. These impulses and

feelings are necessary for our right living and true thinking. They give a final worth to action and an abiding value to truth. An utilitarian philosophy should evaluate them, and find a place for them in its world of contrasts and relations. This, however, it is singularly incapable of doing, since when it attempts such an evaluation the very being of these impulses vanishes. Thus there must always be an inadequacy in this philosophy. It can never give more than a partial view of the world because it ignores one of its most essential constituents. On the other hand, an intuitive ethics and an absolute logic, while not free from errors, both consider the immanent aspect of experience in which these impulses are found. Here a moral impulse and an intellectual thrill are given their worth. Rightly or wrongly, too, they are held to function for a pure experience, outside of the objective flow of consciousness, that contains absolute worth and abiding truth. Here is the psychological basis for a philosophy of permanent values and transcendent significance.

ON TRUTH.¹

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I. THE MEANING OF CORRECTNESS.

Our discussion of truth may be considerably abbreviated in view of the preceding genetic discussions;² for the lines of progression converge very plainly to a consistent point of view. It has become evident that the progress of mind is marked by the differentiation of control spheres into which the classified and dependable and typical modes of experience fall. All this has been traced in terms of the development of 'dualisms.' We find certain great psychic dualisms developing and undergoing constant transformation and restatement with the development of the mental life as a whole.

Further, it is simply a necessity of this development of dualism, as between the inner and outer control factors, that there should arise modes of what we have called 'conversion.'³ This is necessary since the progress of consciousness is toward setting up its constructions as under mediate control, that is as relatively remote from the original experiences with their direct coefficients. The entire development of inner control is, as we have seen, toward the more and more independent construction of a content of presentation and thought, which has its reference however back through some process of mediation to the sphere in which it is to find its direct confirmation again. Images are read as memories, and not fancies, according as they are convertible into experiences of the perceptual type. Private experiences make good only as they are convertible in turn into the corresponding experiences of other persons besides. Thoughts are

¹ Being part of Chap. XIII. of *Thought and Things or Genetic Logic*, vol. I., 'Experimental Logic', somewhat modified to make reference to criticisms of vol. I., by Dewey and Moore (see the 'Comment' below in this issue, p. 297).

² See Chap. XI. of vol. I. of *Thought and Things*.

³ *Ibid.*, Vol. I., Chap. IV., §§ 3, 4.

true and valid when they find confirmation in some more direct mode of experience that they are true to.

We have, therefore, the rise of two modes of meaning — one that of mediation, and the other that of lack or failure of mediation. The fact of mediation is just that of relative reference to the further and more direct control which the given construction mediates. The lack or failure of mediation, while not a negative thing in itself, yet arises from the same motive as that whose positive requirement is mediation.

Now we have found it necessary to recognize at least two great cases of outright mediation — cases in which the evident value and rôle of a construction is to present an original control and conserve its force, at the same time that it is made relatively remote and mediate. These typical cases are those to which we have already given the character of 'mediate control'; namely, memory, taken in the broad sense of reproductive imagery, and thought. Memory is a context that mediates perceptual control by possible conversion into it; this we have shown in the three great cases of the physical, the social or personal, and the merely temporal (the memory of events).¹ Thought, too, is a context set up in a way that mediates the control of the spheres from which its materials come, whatever that may be.

Here we may add, that to deny this character to these two modes of construction — whatever else we may deny of them — is to destroy them, as the modes of psychic meaning that they are. To make a memory inconvertible into direct experience is to make it no longer a memory, but a fugitive or fanciful image, an illusion, a dream; for such states are differentiated from memories just in that they lack this mediation of the coefficients of perceptual or other simpler control. The character of memory, then, that makes it what it is in the actual progression of cognition, is its *correctness*, its accuracy, its way of 'matching up' with the experiences whose control the memory mediates.

So it is with thoughts. Their first and essential character, as a system of meanings set up in a mind, is this: they have a content that is not capricious, fugitive, disconnected, but one

¹ *Ibid.*, Vol. I., Chap. IV.

that mediates the sphere of control from which the contents were drawn. Thoughts are correct or incorrect, according as they are referable or not to something or other in a world in which there is a matching with the simpler contents whose control is thus mediated. The correctness or incorrectness of memories we call their 'accuracy' or inaccuracy; that of thoughts we call their 'truth' or falsity.

I use the word 'match' deliberately, only to discard it later on for the case of truth, since it is actually applicable to memory, and has suggestions that are valuable throughout. In memory there is an actual image, a sort of visual or other picture, constructed on the lines of the original perceptual content, and we can often bring it up in mind so definitely that the real thing can be compared with it, and the details actually matched one upon the other. I know when my memory leaves out a note, when my visual image leaves out a feature, so soon as I have the actual tune or shape reproduced for me, so that I can directly match the two.

In memory, the need of correctness is evident enough. Action in the larger sense, on the part of the knower, depends upon the accuracy of the image that stands for the actual thing. The individual acts upon the thing; then he acts similarly on the memory of the thing; this he can do because the memory has this prime character of *mediating the thing*.

Admitting the analogy between the cases of memory and thought, we may then suggest for memory a pair of questions that are much discussed with reference to thought. Are the memories, we may ask, correct *because we can act on them* instead of on the things, or is the proper account the reverse — that we can act on memories instead of the things *because they are correct*? In reply, I should say that the latter is the proper way to put the case; since, while we cannot act successfully on what is not correct, we can establish correctness without implicating the motive to the specific sort of action. That is to say, granted that action is implicated, and that it is necessarily carried out in actually securing the matching that confirms the correctness, still it is not genetically the motive to the acceptance of the memory item as correct. The same is true of truth, in my

opinion, and so it may be well to examine the case of memory more fully here.

Suppose we take a case recently used by others¹ in advocating the opposite view. One is lost in the woods, and has a 'thought' — in this case it would be largely a memory — of the way to get out. Of all the possible plans of direction, turnings, etc., he acts on the one that seems 'right.' He comes out at his home. Now what has constituted the correctness, or truth, of his plan? — why is the thought of the situation on which he has acted to be labelled 'correct'?

The 'action theory' — so to call it briefly — says the plan is true or correct because it has led to successful action: but for his success in getting out, his plan would have been false. The essence of the correctness or truth of the thought or memory is to be found, then, in its being a plan of successful action.

But certain difficulties with this are so evident that they 'fly up and strike one in the face.' Suppose we ask, how the case would have differed if the man had not got home; would he not still have used the thought as a plan of action? Yes, it is said, but not successfully. Then the critical point is not merely the action, but the success of the action. Now what is *the mark of success* of the action? — how does the man know his action is successful? The only answer is, *by what he sees* or otherwise finds before him when he recognizes the familiar surroundings; that is, by *the perceptual experiences* found to be what the thought or memory presented in image. Without this recognition or identification, *action is vain*. The test then is *a perceptual experience fulfilling² the details of the plan that guided his action*. Instead then of the action establishing or guaranteeing the correctness, it is the correctness alone that justifies the specific form of action. In other words, we are correct in our first proposition made just above, namely, that action cannot get to its appropriate goal without the preliminary presumption that the thought that guides it is correct. Accuracy of imagery and truthfulness of thought are the conditions

¹ Russell and Dewey, *Journ. of Philos.*, III., 599, and IV., 201.

² That is, establishing, confirming, realizing, in the sense of giving the same contents *with the perceptual coefficients*.

of the substitution of these constructions for the original things, which as guides to action they mediate. If the man fails to recognize his home when he sees it, the plan may still be true though to him his action has not been successful.

The 'success' necessary, therefore, does not attach to acting thus or so, but to the mediating of the original physical control for the individual's experience, or for a larger social experience with which the individual's normally agrees.

Now let us take up the second statement, to wit, that correctness may be established without the motive to specific action. Suppose a school boy is put to drawing a map, and draws one that the teacher pronounces correct or truthful, using only the data of his history and geography books, together with verbal hints and instructions from others. Wherein consists the 'correctness' of the map? We are told by the action theory that it is correct or true because one might well act upon such a map, in going say from Baltimore to Washington. Very good, but is this the reason the boy made this map just what it is in its details; is this his motive for accepting the details as correct? Suppose instead of doing what his teacher told him to, he had placed Washington north of Baltimore instead of south. Apart from any experience he has had, any promptings to action on his part, that would do just as well. What then has determined him, what has motivated his actual construction in respect to correctness, what has guided and controlled the making of the map? Evidently the fact that *he did what he was told to do, what all his copies required*, getting what, in other words, *could be converted into experience of a different cognitive order*—in this case into the reported experience of other persons. All this is what we have called 'secondary conversion.' It accepts the personal control of another person's thought as mediated by one's own present thought. This makes the thing accurate for oneself.

Here the successful mediation of a socially common control has established the correctness of the personal thought, apart from any further mediation of the actual physical control in the country represented in the map.

Suppose again, instead of making a map, the boy is to give

an account of a historical scene, or to narrate a series of past events. Here, as we have seen, the events, the transitive parts of the thought context, are *per se* subject to no further confirmation than that given by concurrent testimony.¹ It is the larger social control that mediates the by-gone events as true. The truth is tested by its social acceptability — its corroboration by testimony, written records, etc. — the process of verification being that of secondary conversion into a recondite context of original testimony. In some vague sense, we might say that this could be tested by action; it does have, as all knowledge has, its following, its dynamogeny of active impulses, always proper to the thought; but the motive to the acceptance of the result as correct is not that of doing something or going somewhere, but that of matching the details of one person's thought with those of another's.

We may put this a little differently in order to sharpen the essential issue. To act on a plan is to set up the plan as an end for realization. The action is merely a means to this end. Successful action is action that *gets the end* thus set up — no longer as mere presentation but as fact. Now how is one to know when he gets it? — certainly this confidence is not given in the mere action, in the means. It comes only in the realization of the thing, the something of fact that the construction represented, the fulfilment that the end prophesied. The correctness, the truth, then, is the *end-realizing character of the presentation set up*.

These points seem to me very plain in the case of the control mediated by memory. I say to you that your memory of this or that is correct or incorrect. Or course, you can use it for practical purposes, to get the original things, if it is correct; and you can take the risk if it is not correct. Your justification in either case resides in your acceptance of its right to mediate a sort of experience called fact, reality, or existence.²

¹ Apart from the remote possibility of tracing out physical effects — substantive changes — following upon the event.

² It may be said in objection that by action is not meant alone the gross activity of going to or handling things, but also those functional processes of attention, etc., by which the presentation is constituted what it is. 'What is true' is only another name, it may be said, for 'what is,' under these determin-

We may observe too, before going further with the discussion of truth, that correctness is independent of the mode of origin, and the degree of validity for theory, of the original control meanings thus mediated by conversion processes. However consciousness got the meaning 'physical control,' and however there arose the secondary or mediate controls by which this and others are mediated, still the relative modes remain what they are in their respective progressions. Given a process that has memories, then the entire place and rôle of that mode would be destroyed if there were no conversion of it — no mediation into it of the coefficients already made up in the earlier processes. There are in the progress of consciousness ways of returning to a relative immediacy; this appears in the play and semblant modes; but the character of such modes is shown just in this to be different from that of memory: their differentia *does not consist in relative correctness and incorrectness*. They are not held to the original dualisms as memory is. Memory has its justification just in the relative correctness with which it mediates the coefficients belonging to the worlds of fact or existence.

In an important sense this is true also for thought; it mediates but does not banish dualisms. Yet the processes whereby the mediating control of thought or reflection arises are so complex and their subsequent meanings so legislative and seemingly independent, that the discussion becomes very much more complicated.

Before going on, however, I may point out a distinction that sums up the opposing interpretations suggested above, and shows itself sharply in the two current uses of the term 'control.' As ing processes. This recurs below where we find the 'truth' to be just the 'what is' when the 'is' is the control in which 'the what' is acknowledged. But there our analysis is the same as here (as is anticipated in Vol. I., Chap. III.), *i. e.*, we find that the control sphere is determined by coefficients of various sorts of existence and is not resolvable into the motor processes that operate with and upon them. As soon as there is a control meaning at all it is a dualistic or pluralistic control meaning. There is no valid sense in which these coefficients can be called 'habits' or 'motor complexes'; for habit belongs at the pole of 'inner' as over against external control; and conflict of habits or of habitual selves is within the entire inner sphere that encompasses them (as in the larger synergetic process of attention).

used in my work it means any coefficient or character of a content that classifies and delimits it, giving it a sphere in which it *is or might be present as itself*. We may say of any presentation that it is or might be present in its proper class or sphere of presence or existence. Now on this view the development of knowledge is by the formation and development of these spheres of control; and however far away from the original control coefficients a representative or ideal content may be, it still has the meaning that gives it its assignment to that and no other control. From this point of view knowledge develops within the distinctions of control; there is development of knowledge in idea or thought only through the original controls mediated by these modes — as we have just seen to hold of memory.

Calling this the theory of *knowledge through control* there is a variant upon it that may be called the theory of *control through knowledge* — the 'control' of action, and through it of experience, by means of the mediating context of thought. This is, as I understand it, the 'control' of the *Studies in Logical Theory* and other works of the so-called Chicago school.¹ It is control of a personal sort, management — considered actively — or effective handling of the details of experience through knowledge, reflection, etc. This distinction is, in the sequel, important.² Both phenomena are real, 'knowledge through control' and 'control through knowledge'; but here it may be easily seen that to the latter theory control is what is to the former 'inner' or personal control, one of the sorts of control in general found actual by the former. The 'control through knowledge' is a concept of this active functional relation between self and its world of experience; that of 'knowledge through control' is one of logical or content relation between different modes of experience.

It is of the utmost importance, in my opinion, that this distinction should be clearly understood. We may, therefore,

¹I hope here and below I am not again misrepresenting Professor Dewey. On the whole, though unfortunate, such experiences are frequent, generally mutual. The writers mentioned accept so much that I also hold to, that it is desirable that we keep on 'discussing.' My use of 'control' goes back to my address on 'Selective Thinking' given in December, 1897.

²It is developed in detail in a later chapter of Vol. II. of *Thought and Things*.

seek to sharpen the line of cleavage between the two conceptions — 'control of knowledge by facts,' and 'control of facts or experience through knowledge' — by showing the fundamental way in which the present day distinctions are really based upon their implicit recognition.¹

Let us take a detached point of view for the consideration of the context of thought or ideas. Here is a set of presentations hanging before us for interpretation. We may consider it in the greatest detachment simply for itself, as having its own organization and relationships; so considered it is the content of formal logic. Formal logic strips thought of its references, its implications, both of material truthfulness and also of worth for appreciation. For it, inference is purely a matter of relation, whether or not it be *about* something true or something good. There is then a neutrality as to further intent in both aspects; the ideal of such a discipline is pure validity. For it thoughts are subjects and predicates and nothing more.

Now it is evident that there are two ways of leaving formal logic behind. So soon as we ask what further meaning may attach to such a system of thoughts, we come upon the two conceptions just distinguished: either the thoughts represent and so mediate a control in which they are true, or they represent and mediate a mode of appreciation which they fulfil. In the one case, there is a recognition of a world of facts to be acknowledged or extended; in the other, there is the intent to find worth or value in experience in and through the thoughts. By the mediation of control we have the development of the world of facts, for which the thought is instrumental. Here we

¹I give this of course as my way of describing the difference of view between the two conceptions, not 'saddling' it on anyone else. I cannot accept Dewey's account of our difference without modification — an account that makes my point of view 'epistemological' and his own 'logical' (*Journ. of Philos.*, May 9, '07, p. 255). For while my own is epistemological, recognizing a dualism of self and not-self meanings, his view, while, as having only the dualism of idea and fact in view, it can be called logical, yet as theory of control and reconciliation of the terms of the dualism, it is in its implications more epistemological; for it implicates control entirely of the inner or active sort. It postulates in other words a closed inner process, thus making the entire movement of experience 'inner.' To do this is I think to mutilate thought by banishing the 'outer' control while clinging to the 'inner'; but the position is still epistemological.

have *experimental or instrumental logic* — the science of the *control of thought through facts, or the extension of knowledge as truth.*

This science may be looked at in two ways according as facts or thoughts are made primary. We may consider the motive to be the *establishment of thought* by appeal to fact, giving 'experimental logic,' as a method of the proving of thoughts; or we may consider the motive to be the *establishment of facts* in thought, when we have the science of the development of knowledge as controlled by facts: this is epistemology. We may with confidence write down both instrumental logic and epistemology as sciences of 'truth' — the sciences of the control of thought through facts. Facts of any world, is meant, of course; and facts are experiences of an original order of control coefficient.

But now in contrast to this set of motives and the sciences that issue from them, there is the other great way in which the context of thought has meaning. The neutrality of purely formal logic may be departed from not alone in the way of establishing truth by the control of thought by facts; there is the other departure from neutrality found in the intent to fulfil personal purpose and interest. The system of thoughts is now set up not merely for discovery or confirmation; it is made *means of the fulfilment of ends*. All the selective and purposive motives to individuation come up in the further reading of the context preferentially and so to speak 'axiologically.'¹ The mediation of thought is now not the control by fact and the embodiment of truth, but the acknowledgment of worth. Truth is now means to satisfaction. All the interests besides the theoretical come into their own; and the theoretical interest itself appears as a personal and selective motive.

This is what, I take it, such phrases of current discussion as 'control of experience,' 'control of a situation,' 'dealing with things profitably,' 'readjusting conflicting habits' — phrases used by the new school of theorists of the instrumental order — really come to. Their emphasis is on the *management* of situa-

¹The term 'axiology' was suggested, I think, by W. M. Urban for the science of *worth-predicates* as contrasted with predicates of fact.

tions, the *manipulation* of experience, through the use of a context of knowledge. Knowledge enables us to cope with the worlds of things, facts, experiences, situations, *to get good*;¹ and we use knowledge as means to an end. The inner control factors — habit, attention, disposition, interest, constituting the self — by which the whole movement is motived, are left strangely unexplained. These are not logical terms; they are affective-conative contents.

This it is evident is the sort of mediation supplied to the factor of inner control by the context set up. The ideas are said to guide conduct, the knowledge to become practical insight, the concrete situation to yield to the interpretation and use that thought suggests. All these expressions deal with the relation of the reflective to the concrete, of the idea to the fact; but as soon as we use the word control with reference to it, we see that the 'self' of judgment — the selective, purposive, set of factors — is the control that is mediated. By the knowledge, the insight, the facts are interpreted, the judgment guided, the self factor, whatever its constitution, determined and advanced. There is then the control of facts through knowledge, by the inner synergetic process that counts as 'self.'² The motive is the personal one of reaching an end; a meaning is set up as a desire, a remote worth, and the ideas are accepted as means.

Even the phrase 'solving a problem' used most often by these writers invites this criticism; for the 'solution' of the problem is in terms of 'readjusted habit,' 'successful action,' etc., all factors of just what I recognize as advancement of 'inner control' or 'self.' Such a 'solution' actually gives an expansion of self-feeling, and a sharpened objective plan of the *truthful facts*; *it is dualistic to the core.*

2. WHAT TRUTH IS.

We may introduce the discussion of the mode of truth as such by asking what would be necessary to constitute an active con-

¹ This is the suppressed premise of the whole theory. It substitutes 'good' for 'true,' and fails to recognize the nature of the inner control, for which the good is 'good.' As soon as this is allowed, the correlative dualistic term, the 'external' control, returns also, and the problem is the epistemological one of truth — of 'knowledge through control.'

² The organized self over against impulse, partial habit, etc.

trol process—a mode of action—as the sole criterion or mark of truth, and then ask whether thought or reflection realizes such a requirement. In this way, we throw into relief the differences between the two points of view already spoken of and secure the added interest that comes from having current theories in mind.

If then we ask what would be necessary to banish the requirement of correctness, considered as agreement or correspondence with some control read as external or foreign to the process, our answer would be—simply the banishing of the coefficients of externality. The question then would come back to one which we asked and answered in the first volume of our work—the question as to whether the active dispositional processes could be conceived as entirely making up, and hence as fully fulfilled in, the psychic object, apart from data having coefficients requiring reading as ‘external.’ This we found to be unrealizable for consciousness such as it is; for the existence both of things of the physical order, and of persons apart from oneself, requires the operation of the motives that mature in the mind-body dualism. In other words, the dualism of existences, as meanings of separate control, forbids a purely active determination of things; and replica of the things—the image-objects—together with the variations in the correctness of these latter, are meanings that testify to the truth of this. Now, how is it with the higher mediation, that of truth, in which the terms of the dualism are those of reflection or thought?

It must be admitted that we find here remarkable progress in the sort of mediation which would banish the external control factor, and so tend to reduce all controls finally to one, and that the control of active inner process. This aspect of the development may be spoken of first, before other motives are taken up.

Two great movements are to be noted: one that whereby the control of reflection as mode of inner experience is constituted, and the other that whereby the individual judgment becomes ‘synnomic,’ that is, competent without further control from that of other persons. Let us look at these two movements in turn.

The process whereby thought, functioning in acts of judgment, becomes a mode of mediate control, has already been described. It establishes a heightened and unified consciousness of self, as inner control function, which is in a dualism with all the objects of thought. These objects mediate the inner control which the self in judging exercises over the material it deals with. On the other hand, this inner control process arises by a unification of those more partial factors which represent the inner aspects of prelogical meanings. There is, therefore, a redistribution of the objective meanings also, their resetting as outer pole of the dualism of subject-object. The question now urgent is as to whether the original controls by which the objects of thought were set up and recognized as outer, etc., are now in any sense still operative, when the whole context is made one of thought.

There is, in fact, from the point of view of the personal life-process, no motive that arrests the original control factors, so that we can say that they are banished. The objects of thought, like those of memory, seem to require the sort of fulfilment, in fact of some kind, that the objects of memory do. Yet we find certain complications now for the first time present. For whereas the objects of memory were in a sense 'liftable' from the original things they reported, and also on occasion actually lifted from them; yet this was merely an incident to the essential fact that whether thus separated or not, the two series dovetail together, submitting, on occasion, to all sorts of vicariousnesses and substitutions without confusion.

In the redistribution found in reflection there is no such continuity with fact. The mode of inner control through thoughts establishes itself in a much more radical way. The contents are not only 'lifted' from things and constituted as a different mode of meanings, having a way of mediating the original control, but this is done by a mode in which the whole dualism is established in the inner world. The dualism is one of conscious reflection. In its mediation of the original existence spheres it sets its own form of dualism — a new and characteristic one. The question at issue now is whether, by becoming a system both of whose terms are within the one inner control,

thought loses the intent to refer to spheres of control other than itself. Put in terms of action this would read: granting that the control processes of the inner world are active — motivated by purposes, ends, satisfactions, efforts, etc. — can this set of control processes find fulfilment in the mere contents it sets up, or must there be still a recognition of the external? If the former, then any 'truth' attaching to these contents would be derived from their relative worth as fulfilling personal purposes and interests. That is, there would be no necessity of going to a sphere of fact, to any sphere of simpler perceptual or memory process, to secure further fulfilment.

Only on such a supposition, I conceive, can an action theory of truth be put through — or any theory distinctively pragmatic. It would require the elimination of transcendence *as meaning*, the loss of the external meaning of objects, that is, of any control-reference beyond the set of ideas themselves. Only if ends were fully fulfilled in thoughts and thoughts had no further meaning than to serve as ends — only in such complete coincidence of thoughts and ends would further reference be unnecessary as corrective or control of either.

Now thought does not accomplish this — no more than does memory. Thoughts do not satisfy purpose; purpose runs up against hard facts foreign to it. "If wishes were horses the beggars would ride." Interest does not stay with thoughts; it seeks fulfilments in various external-seeming modes. The thought system mediates these remote controls; it does not banish them.

The struggle of mind, however, to do what the pragmatists attribute to it, is interesting and pathetic. It develops a system of meanings that approximate and personate the completely 'lifted' and self-contained.

Yet it cannot finally absorb all contents as only ends of action, completely dominated by processes of inner control, and rest with that. Not so. It marks its failure indeed by falling into *the diametrically opposite extreme*. It aims to banish dualism of controls and so suggests the effacement of 'self.' For it develops the neutrality of a purely *theoretical interest*, and sets up a *theoretically valid system of thoughts* — a system that is

valid not because it can be acted upon, nor because it is true to anything else, but because, simply and only because, it is reasonable and self-consistent.

We have seen this motive in operation, and have described it as the prime and only progression proper to thought.¹ It is all the while recognizing the necessity of control from fact. It is inductive, tentative, experimental, schematic, quantitative, existential. But in the very bosom of this recognition of foreign controls, it hits upon the contradictions and limitations in the body of its data that motive the validity of thought proper. The whole, set up as identical and self-consistent, then floats off in the ocean of logical form as such. Its validities take the place of former inductive confirmations; its relevancies establish themselves within its own body; its beliefs propagate themselves in the form of syllogistic conclusions; and a body of implications is born that dispenses with any further control than just its own constitution as a system of related meanings.

Now what has happened? It is clear that something important enough has happened. It would seem that thought, the system of implications, has won a victory. The flow of valid relation would seem to take the place both of the concrete appeal to action, and of its dualistic mess-mate, the matching of thought by fact in a world of foreign control. Personal interest has become theoretical, and a body of logical validities has arisen to fulfil this personal interest.

This movement is analogous to the similar swing of the pendulum—just where we should expect it—in the mode of imagery, where the same two factors work out their respective places on a lower plane. Mere memory is everything, fancy is worthless; memory is the thing to be interested in, it guarantees correctness and action; it reports what actually is and must be. Therefore let us rule out preference, personal interest, the vagaries of desire; let us recognize the 'is,' and banish the vain 'might be.' So here also; thought sets up a system of relations that become for it the valid *simply by being linked up together as they are.*

But this of course is not final. Personal desire, purpose,

¹ In chapters before this (*Thought and Things*, Vol. II., Part III., Chaps. X. ff.).

action, 'find themselves' in the very process by which theoretical interest asserts its exclusiveness. A new dualism arises, one of a self that thinks over against the system it thinks about. The selections for action are not annulled even when the dictations of fact seem to be. Thought even when most abstract is after all a system of acceptances, beliefs, personal satisfactions; and the demands of such intent are charged into the abstract forms of the syllogism. A whole world of valuation comes to find its embodiment in the system of thoughts. Thoughts are thus made ends in turn, just as before, and the external controls, the things of fact, are reestablished for the 'realization' of those ends.

We have to recognize, therefore, two general movements in this progression of truth. First, there is the development of validity pure and simple taking the place of the inductive matching and conversion processes of external control. And second, there is the persistent return of the control of fact through the demands of action and appreciation in all the matters of concrete life. Both of these are in so far irreducible. The satisfaction of active tendencies reasserts fact, while the demands of abstract validity tend to mediate truth in a system of static relations.

In short, if things were different, if the life of purpose and action did find complete fulfilment in thought, so that thought had no further reference than just this fulfilment, then such a meaning as 'truth' would be impossible. The 'valid' too would have no meaning. The 'good' would take their place.¹ Thought fulfils desire and desire arouses and propagates thought. There would be no further question as to the existence of the desired in any realm other than or beyond thought. For to suppose such a realm would open just the question of a sphere other than that of purpose or action, giving something beyond *for the true to be true to*.

I think we may safely conclude, therefore, in this matter of the birth of personal judgment as a control mode, that while it seems to show the possibility of bringing all the objects of thought under a unifying principle of control by self, and so to subject the whole content of reflection to the rule of personal action and purpose; yet it works out differently when we con-

¹Opening James' *Pragmatism*, which has just come to my table, I find this heading in the Table of Contents "Truth is a good, like health, wealth, etc."

sider the actual result. Over against the self of control there is developed a system of implication which is universal, self-consistent, and relatively independent of the processes of individual control and judgment. With the growing personalizing of the knowing process comes the depersonalizing of the content of thought. And thereupon there arises the new mode of inner assertion through purpose and appreciation.

From another point of view, also, we reach results of some interest — the point of view of the 'community,' the common meaning, of thoughts. This introduces a somewhat neglected but withal important set of considerations.

We found it necessary, it will be remembered,¹ to recognize as attaching to all judgment two modes of intent both of which come under the general character of 'community'; there is community in the two senses covered by the statement that the judgment is a content having both a 'by whom' and a 'for whom' force. Whatever is asserted is 'synnomic' in that *it intends to be true for everybody*; and it is also 'syndoxic' in that *it is actually held only by somebody*. And these two aspects of community are not coincident. One gives the force of the judgment as *fit for acceptance*; the other assigns the *degree of actual prevalence*. One indicates the universality and validity of the implication contained in the whole meaning; the other indicates the aggregate or catholic process that acknowledges this validity.

Now the question of truth is necessarily a question of truth-to-whom as well as of truth-for-whom; of acceptance in a social group, as well as of worth for acceptance by any single mind. And the interpretation of the nature of the truthfulness or falsity of a body of implications must not be one that mutilates the full two-fold intent of community.

First, then, looking at the synnomic force — the intent for-whom — of a logical content, we find the state of things just described allowing of certain further extensions. The solidification of the inner control, by which a self is determined over against the objects of thought, goes far to bring about the dominance of the selective and active control processes; especially

¹ Again alluding to a chapter not yet published.

in the pursuit of hypothetical and inductive research. For here the schematic meaning rendered as hypothesis is largely a matter of personal interest and active pursuit. Allowing this — despite the fact that in the result this tendency yields to that of setting up an independently valid relational content, as remarked just above — allowing, that is, that the processes of active control are thus greatly emphasized in the individual, still a further question arises as to the determination of the self in these active terms. Is the self that now judges, one of merely individual and private action and purpose; is the control of the self-of-reflection in any sense a private control?

No, it is not. All our work of analysis — and that of recent social psychology — goes to show that the self of judgment is the self of common function, of syndoxic control, of processes so interknit as among individuals that it is reached only by the elimination of personal and private factors. The self of judgment is not the private self of appreciation and valuation; that is expressly excluded in the terms whereby judgment is achieved. The factors of inner control are generalized inner data, read back and forth in the dialectic whereby the 'socius' arises. All the way along, the child's self is not one that asserts his crude first preference or impression, but the disciplined and chastened self that has grown, by continuing processes of secondary conversion, into agreement with others. The opposite process also shows the same result: the self that judges legislates its own result, so far as now and here accepted, back into the minds of others, *being obliged to intend it to hold for everybody*.

The result for our theory of truth is clear. Truth is not a matter of individual interpretation at all, whether in terms of action or of cognition. Suppose we remove the factor of external control altogether and say that truth consists in availability of knowledge to minister to action; still the question comes up, whose action? Certainly not any individual's action; this would reduce the 'for-whom' to the realm of private preference and impulse, making the true that which ministers to personal gratification in a narrow and private sense. This directly contradicts the requirement of synnomic community. The interpretation in terms of action would require the sort of common function or

action that would support and guarantee the intent of universal acceptance.

But this it is evident would again, in the larger social whole of meaning, destroy the distinction between true and good. If the truth is to be the socially available, in a pragmatic or utilitarian sense, it is then identified with the social end or good. What is good in the larger social sphere of welfare is the social end; and this would then coincide with the thought, determined as fulfilment of that end. The same result is reached then on this construction, as on that stated above in individualistic terms, — the determination of truth in terms of good — except that now *both terms are socially controlled*.

This result does seem to be fairly reasonable and just. The derivation of ethical good from social usage and habit, the reflection of social utility in individual conscience, does seem to result in a correspondence, in the processes of natural history, between the accretions to truth and the accretions to good. But the further difficulty would seem to be precisely that which we found in the similar correspondence between individual good and truth; the difficulty of eliminating the factor of external control which appears in this case also in the realization of the ends. Social or common thought could not of itself *fulfil* the social end: that could only come from 'things' that realized the thought. Social welfare is not — just as individual purpose is not — *ipso facto* fulfilled in the setting up of ends, in this case of common ends. There is still here also the need of converting the social ends set up into actual conditions of social life; just as there is the corresponding need in the case of the individual's purpose. In other words, while the socially true is always that upon which *social action may go out*; still there is the *recognition of actual social fact, whether or not it is what is desirable for action*.

The conclusion, then, is that the recognition of the synnomic character of the judgment function, while broadening out the reference 'for-whom' to judgment process generally, does not remove the essential dualism between end and fact.¹ The

¹ This is my line of answer to Professor Moore's attempt to restate the case in 'social' terms (see below in this issue, p. 294).

demands of action are not fulfilled, but only mediated, by the thought context. So too with the coefficients of fact; they are mediated, but not banished, in a socially available system of thoughts. The system, the entire accepted mass of social judgments, thus *mediates both controls*, the socially inner or synnomic and the external, physical and other,¹ in a new dualism, *that of fact and end*. Truth is still a relative conversion of the contents of social acceptance into the facts of a system of external controls. Socially considered, truth has an existential reference that is *not removed by the statement of social desiderata*. As of the individualistic formulation so of the 'social' — the criticism is the same — the *determination of the true is not entirely through the postulates of conduct*.

This result is further enforced from the point of view of the other aspect in which all judgment has an intent of 'community' — the aspect 'by whom,' the aspect of relative catholicity.

Catholicity means relative actual *prevalence of acceptance*, or quantity of aggregate belief. It is that aspect in which meaning is always for a hearer no less than for a speaker, for further propagation no less than for repeated statement. We have seen that in this aspect, as embodied in the linguistic forms of thought,² logical meaning never loses its hypothetical or schematic force; there are always in the social whole individuals still to instruct or convince, always a future of generations yet unborn to whom the linguistic is to be the mode of essential training into competent judgment. What shall we say, as to the interpretation of judgmental matter as true, from this point of view?

We have to recognize at once that in this intent of renewed 'proposal' to others the meaning is reduced from the logical — the fully accepted or 'synnomic' — to the prelogical, the schematic and personal. That which is not yet accepted is, to the intelligence not yet convinced, problematical and personal. The question then becomes, how can such meanings, set as suggestion or 'proposal,' become for that person truth. Evidently only

¹ The other including the other persons who are read as the centers of active and appreciative process just as the one individual is.

² See the PSYCHOLOGICAL REVIEW, May, 1907.

by the processes of confirmation essential in all such cases of the passing of hypothetical proposal into judgments of acceptance. The processes are those of material confirmation, of experiment and induction. But this means a direct resort to those coefficients of control by which fact is established. It is a resort to the sphere in which the hypothesis set up finds its relevant control. The whole affair, then, the possibility of advance in the matter of diffusion, propagation, gain in prevalence and catholicity — the process by which more individuals concur in a statement as true — is one that reasserts the external controls by which the judgment secures its classifications and limitations. I see no escape from this conclusion.¹

It means that the essential process by which relatively catholic acceptance, *by whom*, passes into 'synnomic' acceptance, *for whom*, a matter absolutely requisite to the availability of judgments for social use — that this process is one of *direct resort to the controls of fact*. It is, once for all, not a resort to the sphere of end or action. For the assertion at this stage of the individual's purpose or desire would only emphasize that divergence that would keep the meaning forever in the selective and a-synnomic stage of personal preference. Suppose I decided every matter placed before me in the line of my personal interest and preference; then the agreements by which common truth and value alike are reached would be impossible. There could be no truth, because there could be no judgment at all in the mode of 'synnomic community' — no judgment of that universal import which implicates general agreement.

The consideration of the community intent of judgment, therefore, reinforces, on both counts, our theory of truth. As synnomic meaning thought is available for action *in so far as it is true* — it is not *true because available for action, either social or individual or both*. Of judgment in the forming, of meaning

¹ It has been brought against me that in my address on 'Selective Thinking' (chap. XVII. of *Development and Evolution*), I made truth 'not what is selected because it is true, but what is true because it has been selected.' But this does not at all contradict what I now say; for in that address I explicitly made the 'test of fact' — the gauntlet of external coefficients — part of the process of selection, just as I do here. Truth is what is selected by the whole experimental judgmental process.

having a progressive intent 'by whom,' this is all the more true; for the content not yet accepted could never be accepted, were the rule of determination anything else than confirmation in the sphere of control or fact in which the 'truth' is finally to be acknowledged as open to common inspection.

There is, moreover, a further point to observe in this matter of community. It is a point that comes up in connection with catholicity considered as being a motive that recognizes the individuality of the single person. We say that it is impossible to construe thought entirely from the point of view of the community of synnomic intent, that is, as a body of completely established and once for all given truths. The reason is that there is always also the intent of further propagation and acceptance in a growing social whole. The other aspect or intent of community must come into its own as well, and this recognizes further judgment process not included in the generalization of the personal attitudes, 'for whom,' whereby the synnomic meaning was constituted. This brings up the singularity and separateness of individual judgment centers in a curious and interesting way. The reference of the meaning to the singular persons who do not believe is as real as that to the community of persons who do believe.

Of course, we are not concerned here with the implications of the acknowledgment of single individuals by others; here we have to enquire only into the effect of such acknowledgment upon the theory of truth. This is shown in two ways that we may now point out.

In the first place, the process of conversion, whereby the proposed meaning passes over into judgment, is one of recognition of personalities. It consists in one's taking their thought as source of supply for one's own. The act of getting social confirmation proceeds always by such recognition of others as resourceful selves, whose knowledge is to be drawn upon. Thus the very process by which thought is accepted as true implicates the recognition of a set of judging selves reaching a common result. The inference is that no theory of truth can stand that does not involve a mode of consciousness having not only the subject-object dualism — myself and what I think

about — but also a plurality of subject individuals having a common body of acknowledged objects, or a common body of truths. There is then a *common presupposition* in the implication of *truth*, but an *individual presupposition* in the implication of *belief*. Truth is one; knowers of the truth are many. The commonness of any item of truth is achieved by the act of judgment; but the progress of judgment, and with it the extension of truth, implicates *a set of persons individuated as singular selves*.

The second point is that the individuals so implicated are, each for himself, a center of inner control process; and so are they all *in their meaning to each* — a set of objects having this character. The social selves are, therefore, truths in the same sense that any body of contents are. For me, it is true that you are Mr. Brown, just as it is true that my hat is white. The essential singularity of you, as Mr. Brown, resides in the meaning I must give you, of being a self which besides being a true meaning to me, *also has the common fund of true meanings with me*. The true context of thought as a whole for each then, includes in it all the others who are also reaching the same true context of thought.

Here is a snag upon which the current instrumentalist theories often strike (*e. g.*, Moore, in this issue of the REVIEW). The readjustment of 'conflicting habits' is depicted as a process of attention, a process of restoring equilibrium of action which, if more than a figure, must be *in the individual*. But when it is pointed out that this is individualistic, resort is made to the social force of the content and of the social character of the self (often quoting my 'social dialectic'). But this is not a reply; for there is no *social attention*, no process of reconciliation of *socially conflicting wills*, except by a *return to the individual* as a center of action and thought. This problem, whether set in terms of action (especially) or of thought (no less finally) must be solved in terms of the individual's experience, however fully

¹ My earlier work shows the common character of the self-content, but does not for a moment deny the later logical individuation of singular selves. In my present work I trace out this latter movement. Moreover I am disposed to agree (and in fact I argued for it in the paper on 'Selective Thinking') that the mechanism of subjective control is, as Mr. Moore claims, that of attention.

it may also implicate common meaning. Either all controls (other persons, as well as external things) *must be entirely and finally reflected in the common character* of individual judgment, or thought in the individual *will reassert itself* in a mode of self-notself dualism, which is *also one of personal pluralism*. This latter is the outcome in the mode of thought as such, the mode of truth. Any essential reconciliation by an act of judgment is impossible, since judgment sets up its own dualism of reflection. The position that objectivity arises only when conflict is not mediated by judgment, and that judgment brings a new immediacy, seems to me flagrantly untrue (see the exposition of Miss Adams, *The Aesthetic Experience*¹). For when I judge, I set up and acknowledge a content *as object* over against myself. The dualism of fact and idea is mediated, in the establishing of truth; but just this it is that also erects the further dualism of self acknowledging and things acknowledged, together with that other most pregnant dualism between fact and end.

The true, then, is simply the body of knowledge, *acknowledged* as belonging where it does in a consistently controlled context. The characters of truth are those attaching to the content of judgment as being under mediate control. The meaning of truth is its intent to mediate the original sphere of existence meaning in which it arose. It is possible and necessary, just as any other sort of relative correctness is, wherever there is an original experience having coefficients which the mediating later experience intends and invokes. It is strictly an experiential mode, since the controls which it mediates are those of developing psychic meaning.²

¹ I suppose Miss Adams' is as accredited exposition — and I should say a very clear and able one — of the position of the 'Chicago School.'

² Further paragraphs follow on 'How Truth is Made,' 'What Truth is True to,' 'Falsity and Error,' 'What Truth is Good For,' 'Relative and Absolute Truth,' etc. — topics for which space cannot be taken here. The solutions all depend, however, on these fundamental positions (1) that truth is a system of objective contents set up and acknowledged as under a variety of coefficients of control; (2) that this system is socially derived and socially valid, though rendered by acts of individual judgment; (3) that the whole movement issues in a dualism of self-acknowledging and objects-acknowledged, a dualism from which thought as such cannot free itself.

DISCUSSION.

A FURTHER APPLICATION OF A RESULT OBTAINED IN EXPERIMENTAL ÆSTHETICS.

In a recent experiment on the æsthetic value of a series of repeated units in architecture and design,¹ a certain marked difference in the introspection of my observers suggested opposing ideals in their æsthetic appreciation, which, it has seemed to me, may have a wider application than was claimed for them in that paper.

The difference was this: In looking at designs consisting of a dozen or fifteen repeated figures, which together made a band of simple decoration, the observers described their reactions in two distinct ways.

The first, whom I have called the rhythmic type, enjoyed the units solely in terms of their rhythmic sequence. The activity of moving the attention uniformly from one unit to the next like it was the only charm, and they could not describe their pleasure in the repeated design in other terms than those of simple temporal sequence, analogous to their pleasure in auditory rhythm.

The observers of the other type, from the first described their experience in different terms. They said the passage from one unit to the next had no part in their enjoyment, but was often in fact a hindrance. Their pleasure depended on the satisfaction they got from any unit as a fixation point, with a marginal amount of attention bestowed on the other units extending both sides of the central figure. The experience was a stable one, on any figure for itself. The fact that any one could enjoy rhythm of succession for its own sake, apart from the value of the individual unit, they could not understand. This divergence in method of apperception was at first puzzling, but it ran systematically throughout the experiment. The rhythmic type had little choice as to the unit of the series, provided it was repeated; the static type could not enjoy the repetition if the figure was not intrinsically agreeable — otherwise repetition only made matters worse.

The rhythmic type could not enjoy the series unless enough time was allowed them to look along the design and get accustomed to its rhythm; the static type enjoyed it more if they were not forced to look

¹ 'Æsthetics of Repeated Space Forms,' *Harvard Psych. Studies*, Vol. II.

along its length, but could keep one figure, whether for a long or short time, as the center of balance.

As might be expected, the rhythmic type was more sensitive to uniform spacing between the units. If these interspacings were altered so that there were, irregularly, longer breaks between some than others, the entire rhythm was broken; the static type, however, could not detect that they *felt* the interspacing to be equal, although they *knew* it to be. They spent so much attention on each unit for itself that they lost any impression of a rhythm in going from one to the next.

These and other differences between the two classes of observers have suggested that their two ways of enjoying decorative design are typical of a deeper difference which characterizes two opposing demands of art as well as of life. Many other conflicts in taste may perhaps grow from this fundamental difference of attitude, but I have taken as a possible illustration the characteristic art-appreciation of two great classes of people, the American and the Japanese.

That there are both types of observers in every race and in every community is of course indicated by this laboratory experiment. But it is easier to point out wide divergencies in a national than in an individual taste, and I would suggest that in an average of many cases, the Japanese would fall preëminently into the static division, while the American would fall with more probability into the rhythmic. This anticipation seems justifiable since every one of the apperceptive differences among the laboratory subjects, points to a more extended but similar difference in the ideals of the two nations.

There is a most interesting account of the aims of the Japanese artist in two books¹ by Mr. Okakura, sometime director of the Imperial Art School at Tokio, and now of the Hall of Fine Arts in the same city, and they illustrate in a striking way the apperceptive method of the extreme static type, as opposed to the more rhythmic ideals of America.

These examples are the more interesting since we look to Japan especially as the leader in decorative art. It might seem thus, that uniformity in repeated designs would be its prime characteristic, but on the contrary, it is just the reverse.

It is western Europe and America that have adopted uniform repetition in design, but it is Japan and the East which demand variations to a degree that is confusing at first to one educated on the other basis.

¹ *The Ideals of the East* and *The Book of Tea*.

The Japanese artist may embody the same idea over and over again to suggest infinity, but in his decorative series, the figures and often the interspacings, are not uniform. His method of apperception is to immerse himself completely in each unit — which is, of course, utterly opposed to the active hurrying from point to point which the rhythmic observer feels essential to his pleasure.

It is indeed possible to go through the list of characteristics as they appeared in the laboratory observers, and apply them with equal correctness to the art of the two nations. Much of America's improved taste has come directly from Japan, so the styles which our public has adopted, and which it has, so far, refused to adopt, show distinctly where falls the division line, between the two typical tastes.

1. The rhythmic types were but little affected by the beauty or ugliness of the unit, so long as it was repeated.

We are certainly familiar with this taste in every-day architecture. Rows on rows of undifferentiated pillars, windows, and machine-made decorations valueless in themselves are tolerated; but the tiresome character of the units does not shock us, as would one or two placed above the level, or at unequal distances. Contrast with this the horror of monotonous repetition in the mind of the Japanese (p. 96, *Book of Tea*). "Uniformity of Design was considered fatal to freshness of imagination." "In the tea-room the fear of repetition is a constant presence." This dislike of repetition has gone so far as to center the skill of Japanese artists on birds and flowers, rather than on the human figure; for a human spectator being always implied by an art-work, there would be a repetition of a similar form, if one were also represented in the picture! The Japanese cannot understand our habit of decorating dining-rooms with pictures of game or fruit. Since we of necessity eat in the room, it is the place of all others where food should not be duplicated in the pictures. One finds continually in cloisonné vases different designs within the same pattern, as if the designer were impatient of that very recurrence to which we are accustomed. In any art, observers of both types would agree that in proportion as a unit has individual value, serial repetition becomes less allowable, so it would naturally follow that to the observer whose every art-object is an end in itself, repeated series would be intolerable.

2. The rhythmic observer in demanding a given amount of time to feel his rhythm, demands necessarily that the succession be not hampered by unequal attentive periods on the different units. On the other hand the ideal of the Japanese is to 'catch a glimpse of infinity' in each beautiful figure, and the notion that he is bound to a

time limit to move from one unit to another similar one, is abhorrent to him. Each figure speaks for itself, and involves submersion *in it*, not activity in moving *from it*.

Even the single art object must avoid symmetry (p. 17, *Book of Tea*) since that implies a repetition of equal distances two sides of a middle point. This in itself is in striking contrast to the American habit of decoration.

3. Another interesting tendency of the rhythmic observer in the laboratory was to greatly overestimate his interspacings. Both types were asked to arrange a set of figures at distances from each other equal to the width of the figures. Since these units had groups of lines within themselves, they had the character of an optical illusion, and both classes overestimated the spacing, but in an average of three trials, the rhythmic type overestimated twice as much. Apparently the very motor activity which constituted his pleasure, carried the rhythmic observer beyond his limits and made him 'see large,' whereas the static type, more absorbed in each unit for its own sake, had not the same motor impetus to overcome, and saw smaller.

Could there be a more obvious distinction between the tastes of the two nations? The heavy façades, long colonnades, many steps and wide doors which characterize American architecture contrast strikingly with the delicately small proportions of the Japanese buildings. We do not mean to imply the superiority of the 'static' demand; certainly the simple repetitions of the Greek temple make that impossible; but the common American 'commercial decorating' illustrates the rhythmic ideal without the balance of the opposing tendency; and it may be that degenerate Japanese decoration might show the opposite fault of confusion, though as yet they seem to have preserved better their artistic conscience.

If one might generalize even more on this laboratory suggestion, it would seem as if the Westerner's love of activity for its own sake was an expression of his rhythmic life, his enjoyment of every experience in terms of regular accented successions; while the isolated absorption in the unique experience of the Oriental was an equally characteristic indication of the static method of apperceiving life as well as art.

There are both kinds of observers in every race, but in a general sense the rhythmic activity of one leads to music, rhymed verse forms, and regularly repeated designs, even to athletics and science, since these are relative activities, never the perfect moments of repose.

On the other hand the static type tends more to the visual arts, especially to exquisite materials, color and workmanship, to small

detail and endless variety in design. Moreover it is in the East that mystic philosophy and religions flourish, since they express not relativity but absolute values, where temporal successions have no meaning.

Now that Japan is open to the west and gaining our scientific activity, she is having to fight hard for her national art, while we are learning from her the value of unique beauty as distinct from the relative.

Perhaps the perfect art-lover as well as race, will represent a union of both apperceiving types.¹

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EXPERIENCE, HABIT AND ATTENTION.

In my review of Professor Baldwin's *Thought and Things*, Vol. I., in the PSYCH. BULLETIN for March of this year, I referred to Professor Baldwin's criticisms of the attempt to state cognitive experiences as part of the whole process of the readjustment of conflicting habitual and instinctive activities through attention. Professor Baldwin's objection was that such an account cannot take care of the case of 'a new and unwelcome object which simply forces itself upon us, * * * which rides full armed through our walls and compels its recognition.' My reply was to the effect that this very 'new,' 'unwelcome,' involuntary, 'forced' character of the object, when *analyzed* instead of being accepted as ultimate and quasi-miraculous, turns out to be just as much a function of habit and attention as the 'voluntary' cases.²

Without any further attempt at analysis, Professor Baldwin in the May number of the BULLETIN reaffirms his objection and adds another edition of it from the standpoint of volitional instead of cognitive experience to the effect that in such a conception of experience there is no 'motivation.' He says 'I can't rest content with a dynamic that has nothing outside to move it and no reason inside for moving.' This sounds wonderfully like an appeal to the outside 'unmoved mover' the insoluble difficulties with which our Greek forebears, to say nothing of Locke, Hume, Kant, et al., discovered. To rehearse these would, I take it, be an unpardonable anachronism. As for 'no reason inside for

¹ The MS. of this article was received April 4, 1907.

² Most of this discussion was in MS. when Professor Dewey's article, which more than anticipates the main point of this paper, appeared in the *Jour. of Philos., Psychol., etc.*, for May 9. But as Professor Dewey in that article points out the necessity 'for constant dripping to wear down the stony hearted' I send this to print as a contribution to the 'drip.'

moving,' what better reason could there be than the conflict of the habitual and instinctive activities with its accompanying dissatisfaction.

Again, Professor Baldwin asks: "If experience proceeds by readjusting *to* situations, whence comes the situation that 'puts it up' *to* it to adjust" (*italics mine*). Now the use of the preposition '*to*' both locates and at the same time begs the whole issue. In the view which Professor Baldwin criticizes experience proceeds by situations *of* readjustment, not by adjustments *to* situations. The situation to be readjusted is one *in* and *of* experience, not one which is 'put up' *to* it from without. That Professor Baldwin must be aware in some measure of this view seems implied in his next question: 'Why does it (experience) grow discontent with *its own* habit world' (*italics mine*)? This certainly assumes that somebody regards the readjusting situation as made by the discontent of experience with *its own* habit world.

As for the answer to the question: 'How this discontent can arise,' that is not far to seek. As has been pointed out again and again, it is due to the fact that habits are constantly *coming into conflict*. In more general form experience has constantly to face the results of its own work and utilize them as the material of its own further development. And if it be further asked how this conflict reveals itself, the answer is; through dissatisfaction and pain.

The same point is involved in the following questions on my answer to which Professor Baldwin says he 'will stake the whole business':

"First. How can experience of the dynamic-relative type secure or utilize knowledge that is socially valid without at the same time reinstating other things as valid, as the social fellows, including the thinker himself?

"Second. How can an experience that has no environment except its own habit and no reality, save its present function, set up any dynamic at all?

"Or to put these two questions in one: In what sense is the will of the mother spanking the child part of the habit of the child, and why does the child's experience take on this particular phase of relative dynamic — this occasional and very disconcerting phase of habit?"

In this last inclusive and very concrete form of his question I assume that Professor Baldwin does not intend to put me at any empirical disadvantage by having the 'mother' instead of the father do the spanking — an arrangement which, personally, both as a child and as a parent I have always favored. As for 'staking the whole business

on my answer,' that happily is not necessary, as that is a responsibility already shared by many others.

In general, Professor Baldwin's questions all reveal the chronic and apparently incurable determination of most critics of pragmatic doctrines to take, at any rate in their criticisms, the terms 'experience,' 'consciousness,' 'habit,' 'attention,' etc., in the sense of the 'experience,' 'consciousness,' 'habit' and 'attention' of some *one* individual. Whereas all these terms, when they are used without explicit reference to a particular individual, refer to the *entire world of activity* in which all experiencing individuals have their being — 'experience' being the general term for that world of activity, the other terms meaning particular modes or functions of that activity.

This does not mean that these particular modes or functions, such as habit and attention, may be regarded as some sort of disembodied 'things in themselves,' capable of an existence apart from individuals. They are the functions, the modes *of* the activity of individuals — habit being the conserving, the mechanical, the structural mode, attention the reconstructive, reforming, readjusting activity. While this conception does not then in any sense attempt to substitute experience, habit, or thinking in general or at large for the experiences, habits and thinking of individuals, it does protest just as insistently against regarding these activities as shut up within the epidermic confines of some one individual. However much John Smith's habits and ideas belong to him, they belong *also* to the whole community in which he lives and which is affected in any way by them, be that as large or small as it may. Conversely, just this community center of habits and ideas *is* John Smith. That this is to be taken literally and not figuratively, Professor Baldwin himself shows in his volumes on *Mental Development*.

Now if this conception of the habits and ideas of the individual as *also* functions of the whole community life, be kept steadily in view, it would seem that the impossibility of framing such questions as the above is as obvious as their answer.

Turning to the first question, Why should anyone speak of 'reinstating social fellows' and 'other things'? Who has turned them out? Surely not those who teach that problems arise, run their course and find their solution not in the solipsistic realm of John Smith's habits and ideas as a complete world in itself, but in the habits and ideas of John Smith as a conserving and reconstructive agent of the whole community life.

As for the second question, in view of what has already been said

of the place of habit in experience, it seems redundant to add: (1) that habit cannot be regarded as an external environment *to* experience, or (2) that experience does not have to 'get up' any dynamic. The 'dynamic' is already there: (a) in the obviously active character of the habits; (b) in their coming into conflict; and (c) in the reconstructive work of attention.

Professor Baldwin's putting of the 'spanking' question lends itself somewhat temptingly to facetious treatment, but as the case is really a serious one for all parties concerned, I prefer to treat it so and to observe; first, that in urging the distinction between the experience of the mother and that of the child, the question seems irrelevant to the original issue, which is the possibility of stating the *whole* situation whether it involves one person or a thousand, few or many things, in terms of a conflict of activities resolved through attention. It insists that the *whole* situation, including the mother, the child and the spanking, whether regarded from the standpoint of the mother, the child or both, is a system of conflicting activities undergoing reconstruction. And from this standpoint there is no more need for identifying the ideas or will of the mother and the habits of the child in the sense of making them the *same* thing or making one a 'part' of the other, than of identifying habit and will in the mother, or in running together distinguishable functions or aspects of any other process.

Admitting, *freilich* then, the distinction between the activities of the mother and those of the child, we must yet keep hold of the fact that if they are not 'parts' of each other, yet *they are 'parts,' in the sense of constituent interacting activities, of one situation.* This is reflected, in general, in the very terms in which we state the case. The performance as a whole may be stated either as 'the mother spanking the child,' or 'the child being spanked by the mother.' It depends on the point of view. Again, the term 'mother' implies that one of the individuals is the *kind* of an individual that has the habit, the attitude of caring for 'her child.' And the term 'her child' implies that the other is the *kind* of an individual that is to be protected by the mother even to the extent of being spanked, if need be.

Following the analysis still further, and still speaking from the standpoint of the *whole* situation, how can 'the will to spank' be regarded as the exclusive production of the mother? It surely is the outcome of the conflict between the mother-attitude of perceiving and keeping the child in safety and the child's present activity of, say playing with the fire. It is a joint product of these two sets of activities, and one is as essential as the other. The attempt to regard the will-

ing as the exclusive production of the mother alone transforms the concrete will to-spank-this-child-now-playing-with-the-fire into an abstract 'will to spank' *überhaupt*, with nothing particular to spank,—the essence of a profoundly tragic situation.

But Professor Baldwin may say, after all 'the spanking' is 'forced' on the child as the perception of the-child-playing-with-the-fire is forced on the mother, to which I would rejoin: (1) Even so, this but sustains the original contention that however 'new' or 'forced' or 'unwelcome' the experience may be, it still is statable in terms of the readjustment of conflicting habitual activities through attention, and even if for any reason one wished to state the case from the standpoint of the mother or the child alone there are no other terms so far as I can see for the statement. (2) The spanking is no more 'forced' on the child than on the mother. In fact, psychically it may be much less so. However skeptical, we may have been about it as children, we have since learned that our mothers spake truly when they said: "I am sorry that I am 'forced' to punish you." (3) For both, neither 'the spanking' nor the playing-with-the-fire viewed as *an occurrence* is any more 'forced' than anything else that may have preceded, as running, talking, sewing, etc. Even the image of the child playing with the fire is no more forced upon the mother than her own breathing, her impulse to rescue the child, or her will to spank it. In this sense, all those activities which constitute the 'self' of the mother upon which other things are said to be 'forced' is as much 'forced' as the things. In this sense everything is 'forced.' 'Forced' here means simply 'happens.' And in this sense things are no more and no less 'forced' upon us than we are 'forced' upon things, or 'forced' upon ourselves. What goes on *within* our 'walls' is as much 'forced' as the thing 'which rides full armed through them.' As a matter of fact, this mere happening of things, however 'new' or 'sudden,' *e. g.*, Professor James' classic thunder-clap, is not experienced as 'forced' *unless it conflicts* with activities or attitudes already going on. And even then the 'force' obviously is not all on the side of the 'new' factor. It is met by the force of the activities already there. Pursuing the figure, the forces behind the 'walls' are not asleep waiting to be aroused from without. They are already active. And if the new factor be recognized as an improvement, it may be made the basis, the ideal, of the reorganization, in which case the old habits instead of the 'new' content, will appear as the 'opposition.' It is, then, only when there is a *conflict* of happenings and some content is selected as an *end*, that the other activities, the readjustment of which

this end demands, seem 'opposed' and 'external' to the *end*, but not opposed or external to the *whole* situation or to 'experience.'

As these remarks are already beyond their allotted space I cannot take up the other and relatively minor points to which Professor Baldwin refers. However, regarding my complaint of confusion in the use of terms I should like to ask what is meant by 'trans-subjective' and 'extra-psychic' realities in view of the following: "The envelope of the developing psychic process is *nowhere ruptured*. The controls, 'foreign' as well as 'inner' are *all* psychic meanings." (BULLETIN for May, p. 126). A foot-note, p. 12, *Thoughts and Things*, says extra-psychic 'means independence merely from the *individual's* psychic process.' But a foot-note on the psychic 'envelope' in the above passage says: "It is, however, an envelope of *inter-psychic* or common, in no sense private, meaning." So far as I can see these passages use 'psychic' in three senses: (1) As meaning 'the individual's psychic process'; (2) as including other individuals; (3) as including *all* 'foreign controls' whether other persons or things (*italics mine*).

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COMMENT ON PROFESSOR MOORE'S PAPER.¹

Professor Moore's position assumes 'habit' and 'instinct' and also 'conflict,' and withal 'attention' to 'readjust' them. But genesis must account for all these things; the same question of accommodation *vs.* habit arises in the simplest organism and the 'motivation' of a process is not explained by the assumption of its whole machinery. It is this that leads us — the critics — to say that the scheme is thoroughly individualistic. It would seem necessary to restate it *in social terms*. To this Professor Moore agrees; but then, as I think, he fails to give us a coherent restatement in social terms. The point at which he fails is one indicated in the article above and in detail in my book; in brief, the social process has no 'attention,' the conflict of wills gets no sort of readjustment in such terms as habit and instinct — save by a superficial analogy — and the whole mediation must go back to the individual proc-

¹ As it happens a proposed contributor to this issue deferred sending in his paper; and I take the space to print part of a chapter of volume two of the work that called out Professor Moore's remarks. In that article (above, p. 264) I answer both his and Professor Dewey's criticisms (*Journ. of Philos.*, May 9, 1907) more effectively, by expanding my own view, than I could in such more fragmentary discussions as this.

ess again, *dealing now with socially derived and socially valid meanings*. That is, social truth must be rendered in individual judgment — must be what I have called *synnomic*. But just here the individual factors of the whole mode of personal judgment reassert themselves, and *the new dualism of self and things*, knower and known, is constituted. In other words, the factor of foreign control again arises, in the constitution both of things and of the persons of the objective world of reflection.¹

I am, as Professor Moore is, seeking for a reconciling mode of experience; I do not, however, find it where he does. I cannot avoid seeing that *for the knower* there is a very compelling and intruding sort of experience—that is what the much criticised sentence about the 'unwelcome presence that rides full-armed through our walls' means, and about all it means. This is *for and by him, the knower*, read as a 'foreign control' over against the tendencies—habits, instincts, volitions, etc.—that come to mean, all the way through, inner control. Judgment bridges this chasm, but opens another one—that of the dualism of reflection. The real mediation is found in the 'semblant' consciousness as I intimated in my closing remarks on Professor Moore's review (*Psychological Bulletin*, April 15, pp. 124-6).

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¹In this connection I may answer Professor Moore's question as to the meaning of 'psychic.' It is as he says "(1) the individual's psychic process, (2) as including other individuals [among *the meanings* it gets and entertains] and (3) as including all 'foreign controls' whether other persons or things [also among the meanings it gets and entertains]. My explanations are inserted in brackets. It is all 'psychic' in the one sense; and that hits upon the requirement noted above, that even when the common or 'social' point of view is taken, the function of readjustment, of advance, of mediation must be interpreted as going on within the 'psychic-envelope' of the individual's mind.

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